



Handwritten Notes
On
Test of Anions

Test of Anions:

or

Test of Acidic Radicals:

Class - 1

Subgroup - I

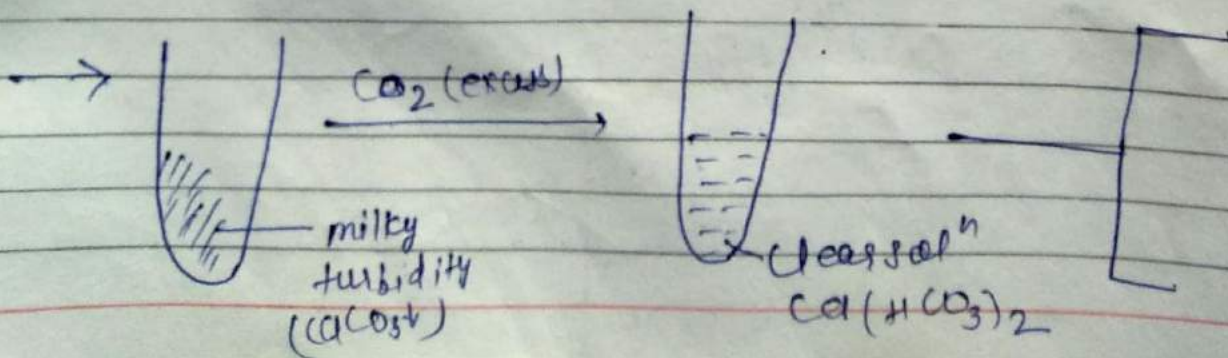
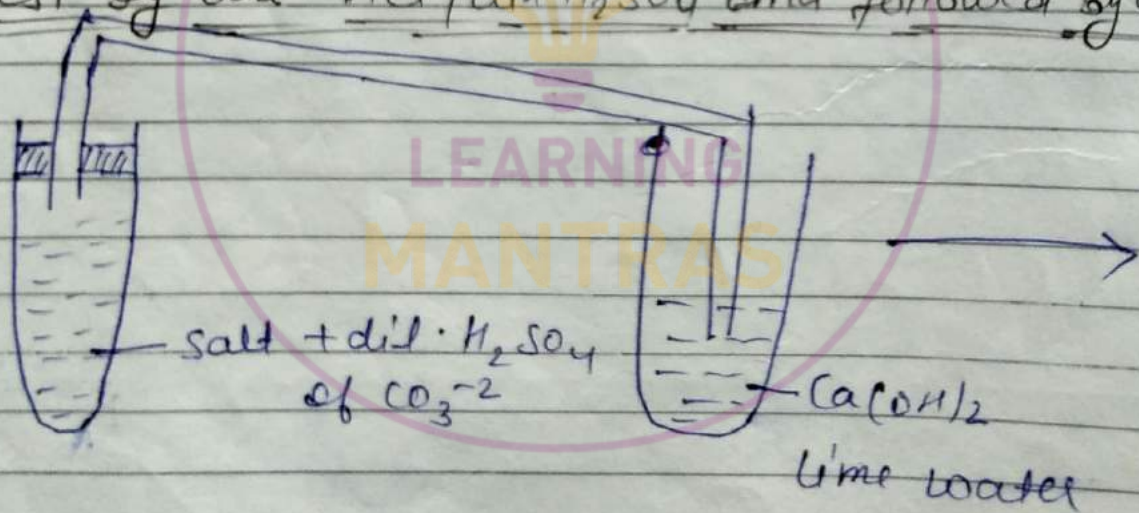
group reagent \Rightarrow dil. HCl / dil. H_2SO_4

(1) Test of Carbonate ion (CO_3^{2-} ion)

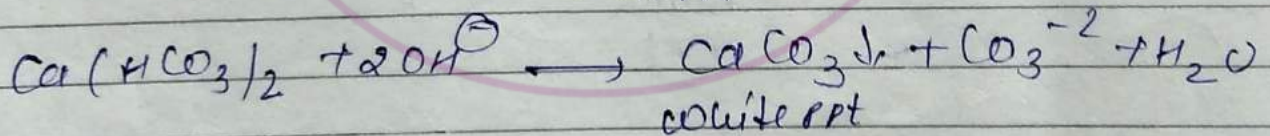
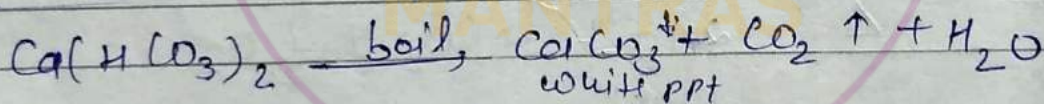
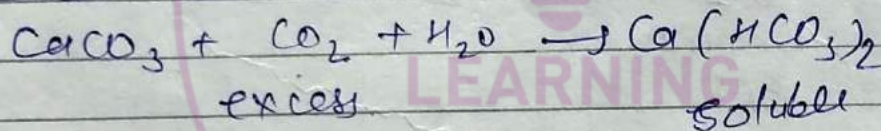
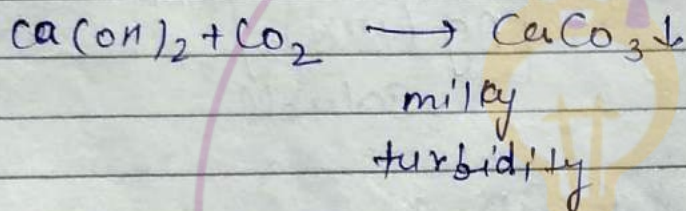
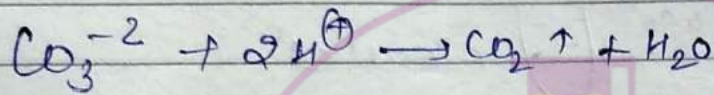
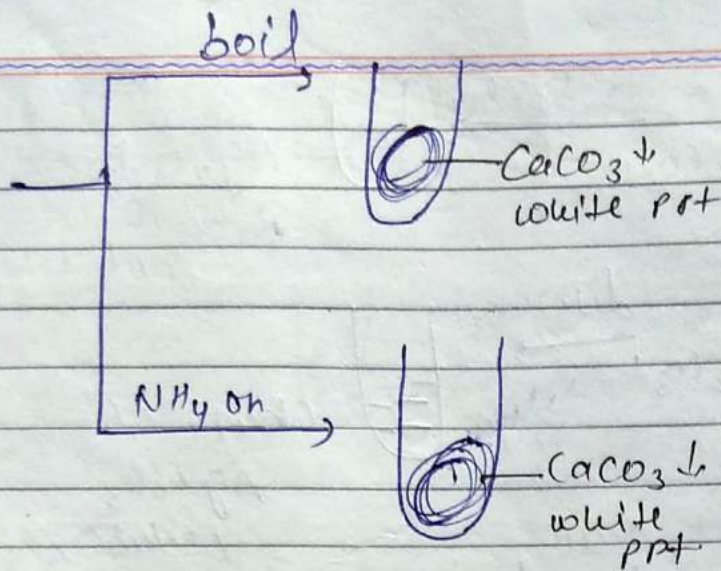
All carbonate (CO_3^{2-}) are water insoluble

Except - PA carbonate, Li_2CO_3 (s.s), $(NH_4)_2CO_3$

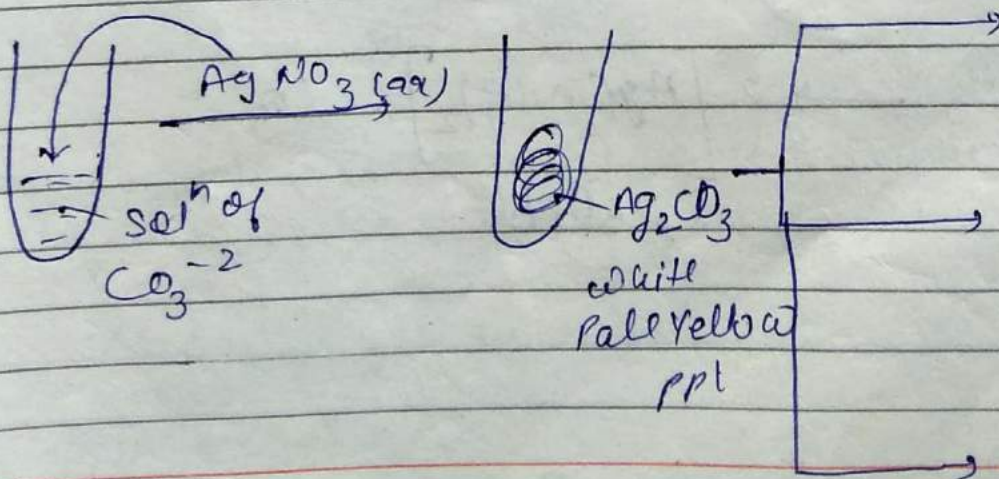
(i) Test by dil. HCl / dil. H_2SO_4 and followed by lime water

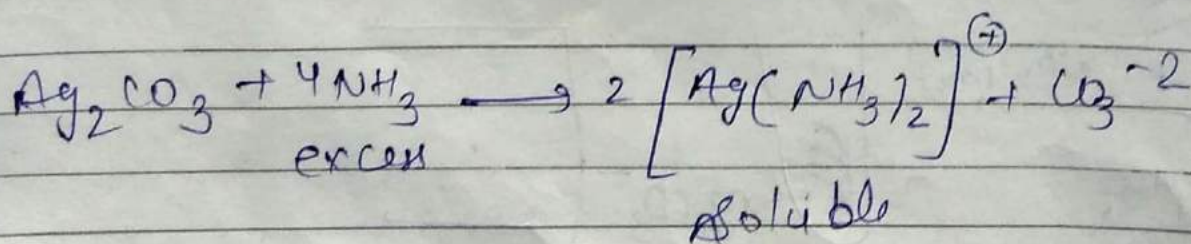
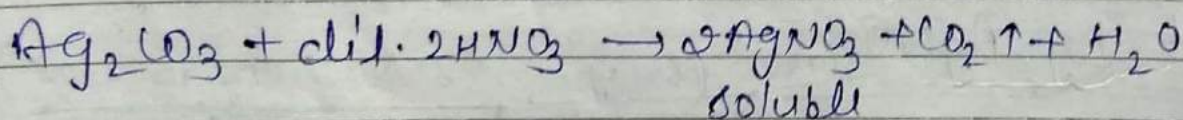
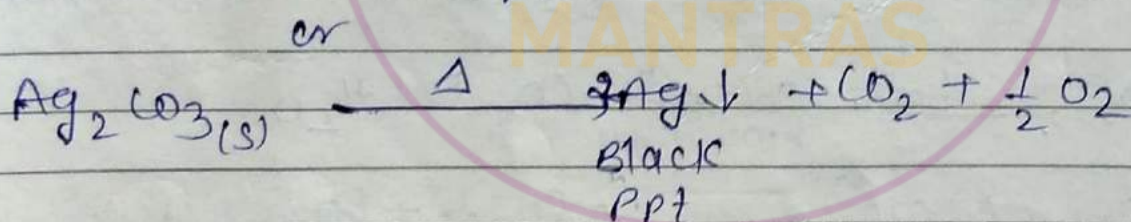
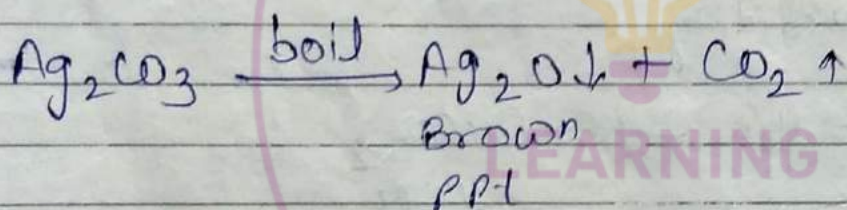
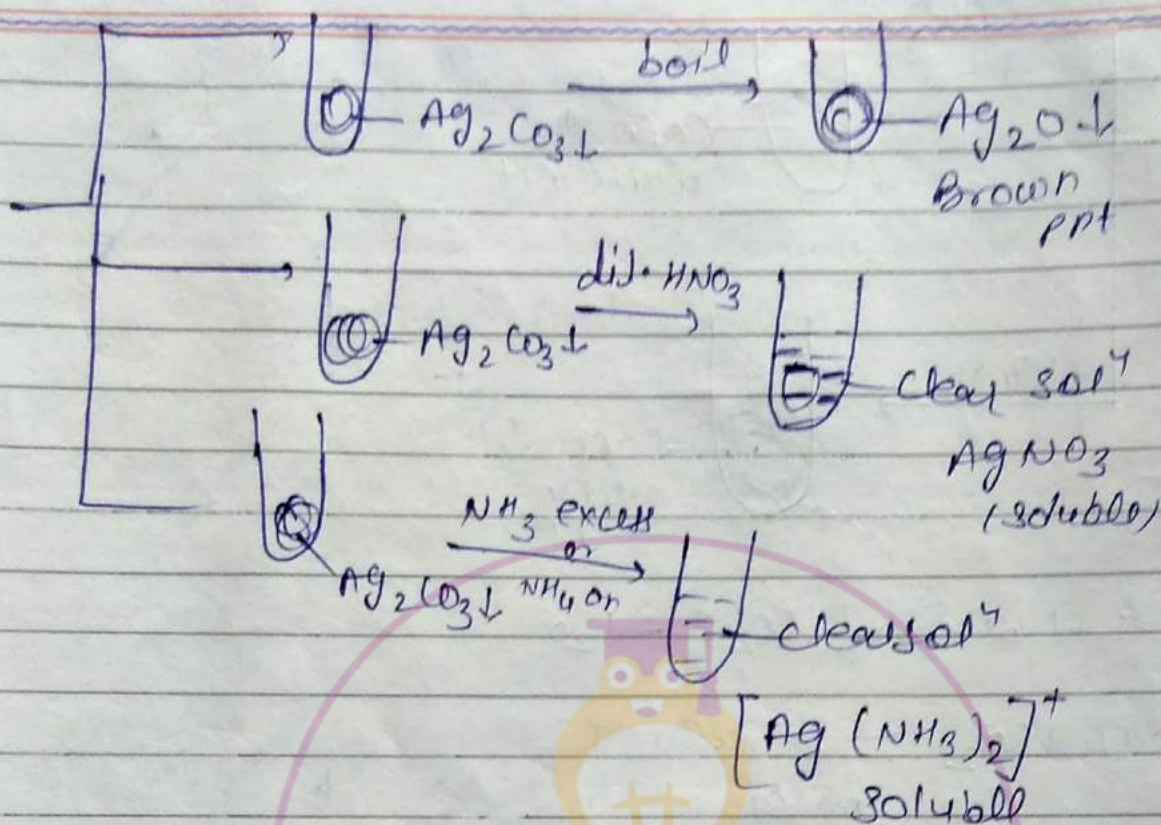


Heating effect

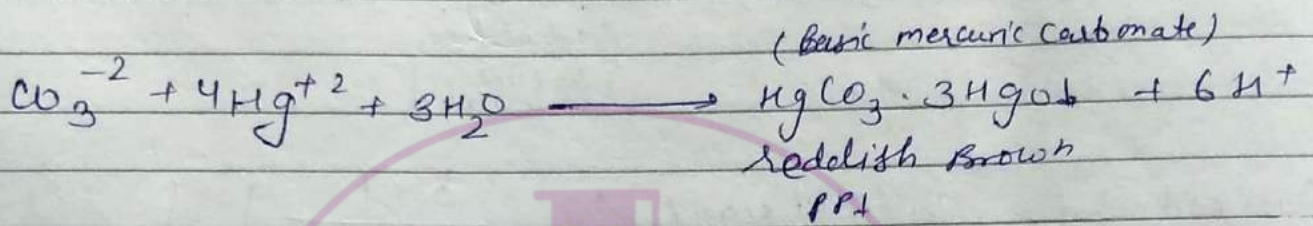
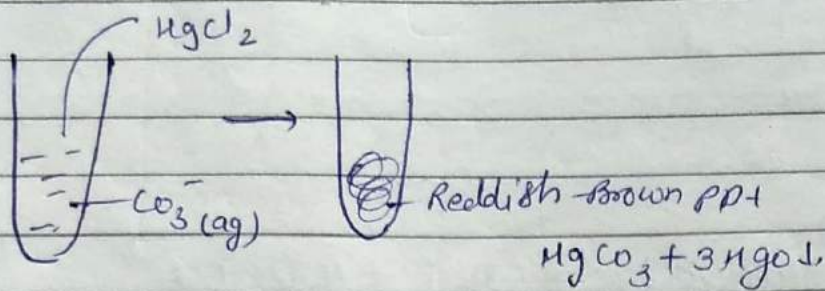


*2) Test by $\text{AgNO}_3(\text{aq})$: (only for soluble carbonates)



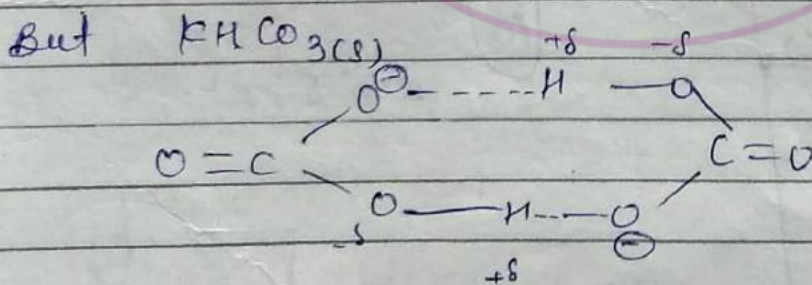
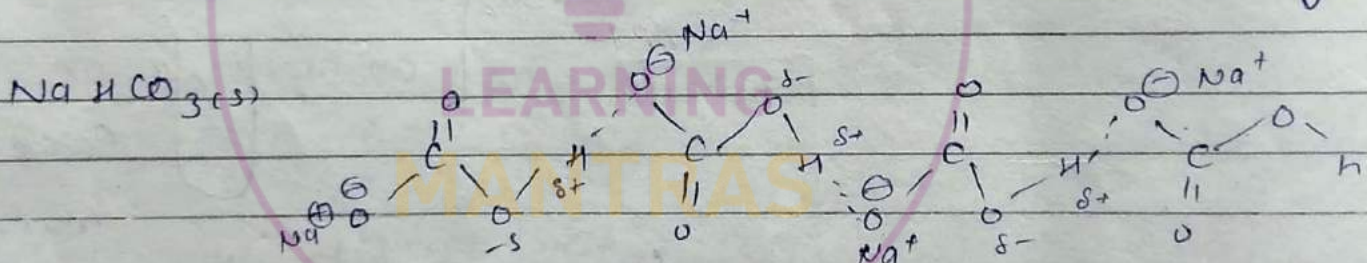


③ Test by $HgCl_2$ (Only for Soluble carbonates)



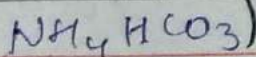
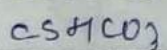
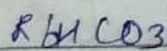
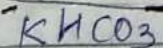
* Test of bicarbonate (HCO_3^-)

All bicarbonate ~~are~~ source are water soluble but $NaHCO_3$ is less soluble in water due to H-Bonding.



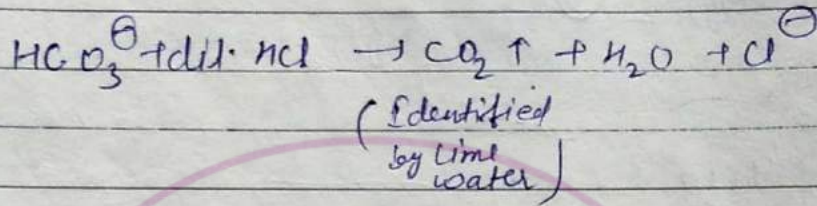
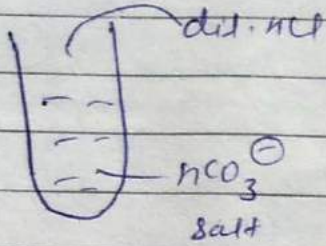
→ only five bicarbonate exist in solid form

$NaHCO_3$ less soluble in water due to H-bonding

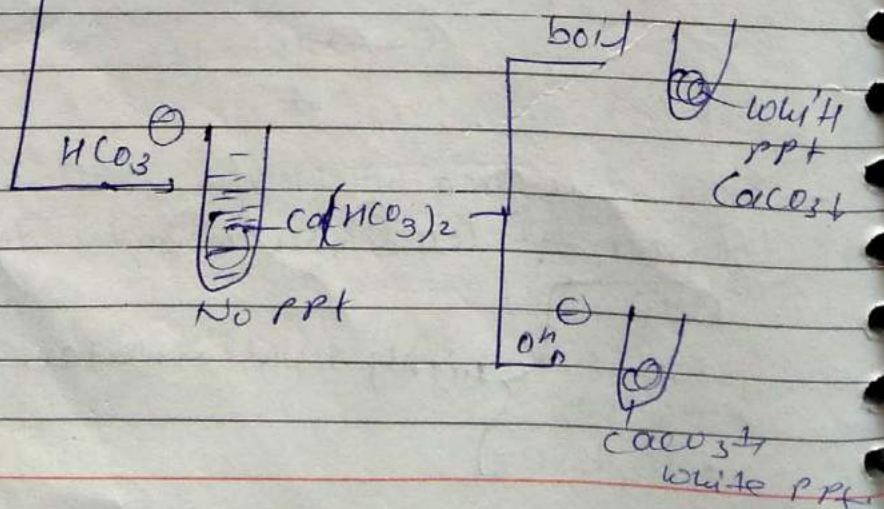
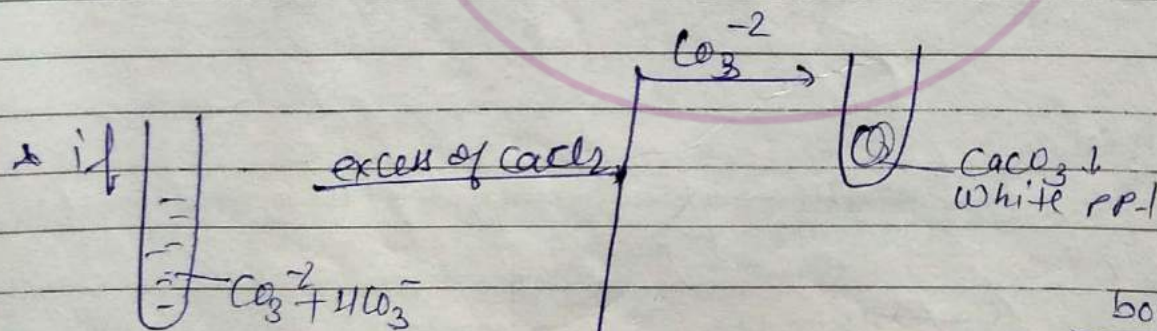
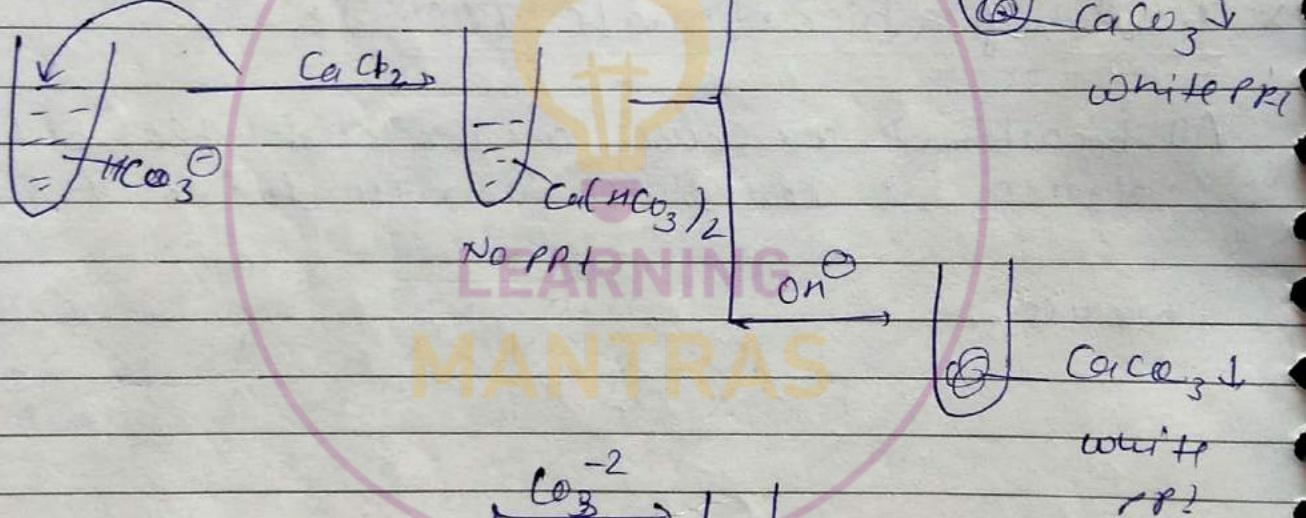


} slightly soluble in water.

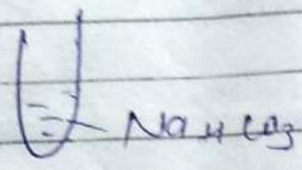
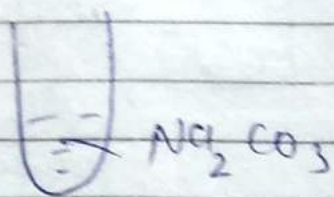
(1) Test By dil. HCl or dil. H₂SO₄ : (and followed by lime water)



(2) Test by CaCl₂ / MgCl₂



Note: Difference b/w Carbonate and Bicarbonate.



MP

pink

Colourless

CaCl_2

$\text{CaCO}_3 \downarrow$ white ppt

No ppt ($\text{Ca}(\text{HCO}_3)_2$) $\xrightarrow{\Delta}$ $\text{CaCO}_3 \downarrow$ white ppt

HgCl_2

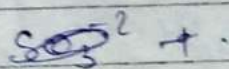
$\text{HgCO}_3 \cdot 3\text{HgO}$
reddish brown

No ppt

③ Test of SO_3^{2-} (sulphite anion):

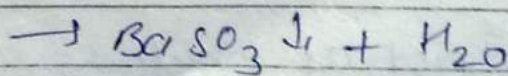
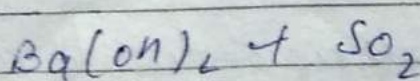
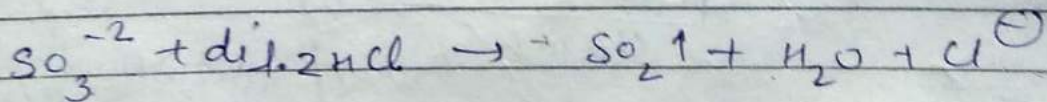
All sulphites (SO_3^{2-}) are water insoluble except - $(\text{NH}_4)_2\text{SO}_3$

① Test by dil HCl / dil. H_2SO_4 :

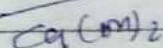


SO_2 - colourless

pungent, or croaker smell

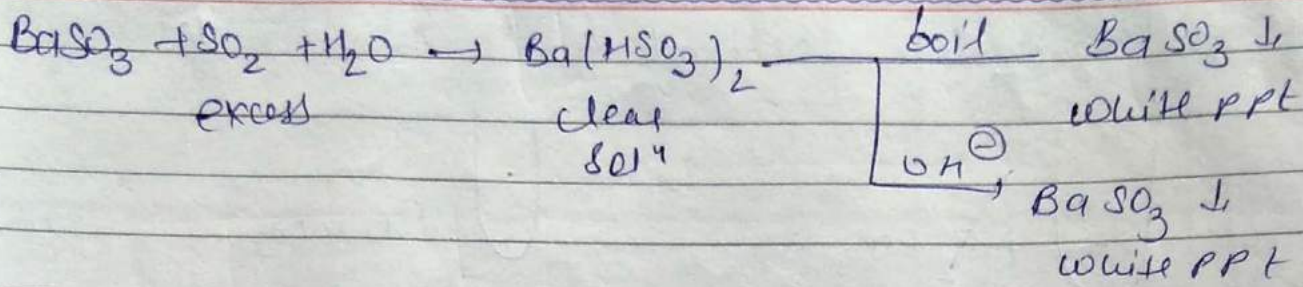


Barytes water



milky

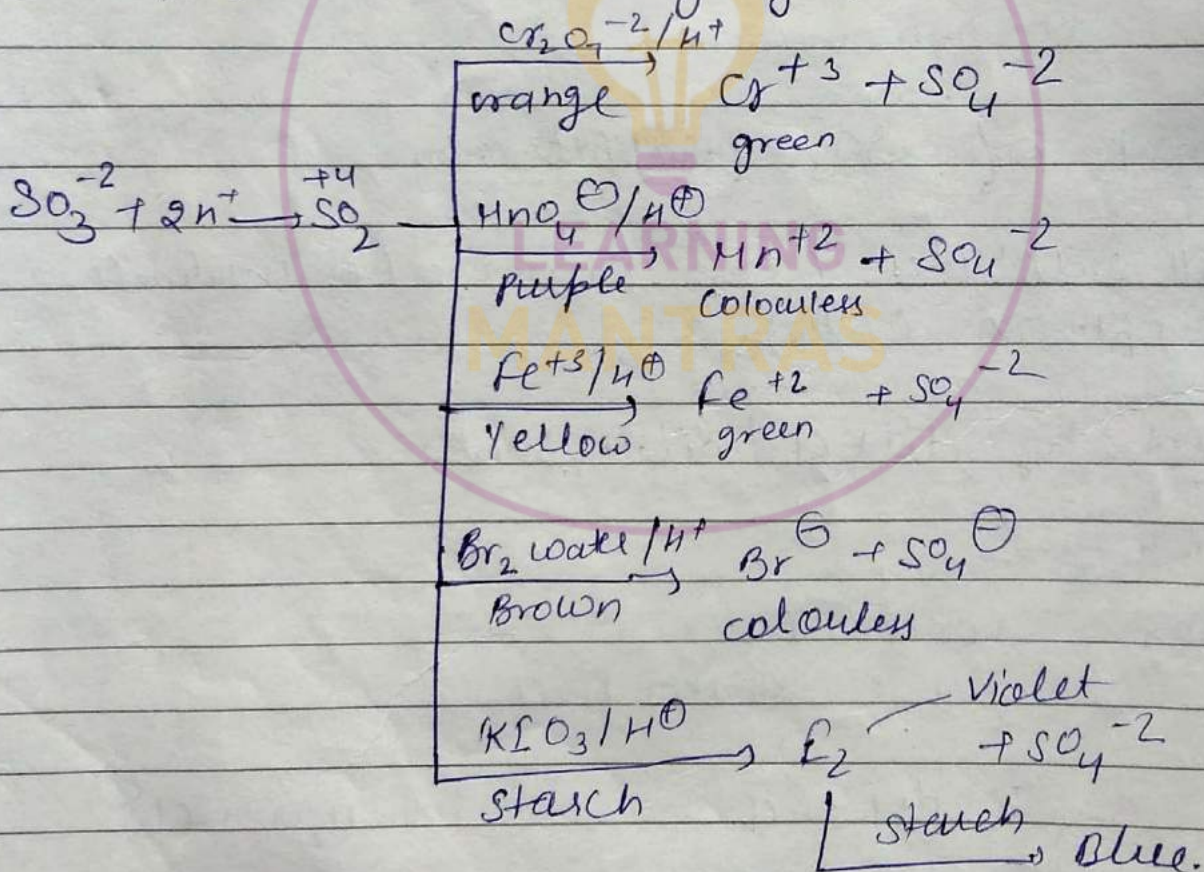
turbidity



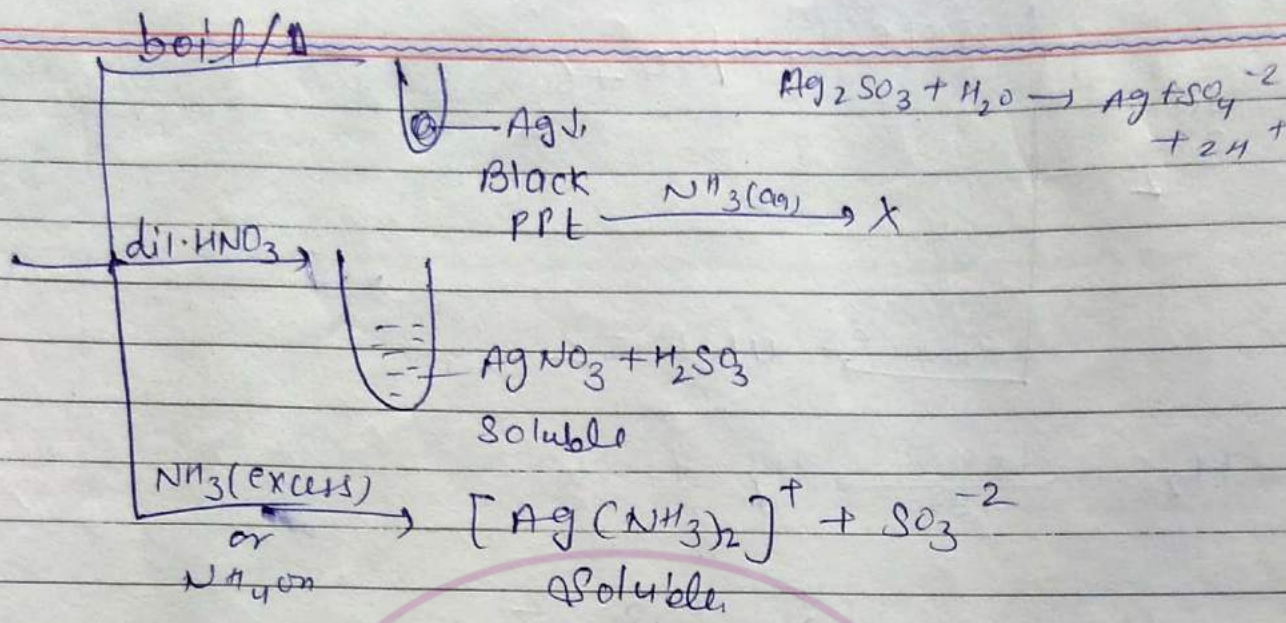
(ii) Test ~~based~~ ^{based} on reducing Nature of SO₂ :

test by dil. K₂Cr₂O₇ and followed by oxidising agents !

Above test is given by CO₂ SO₂ Confirmatory test of SO₂ based on its reducing agent

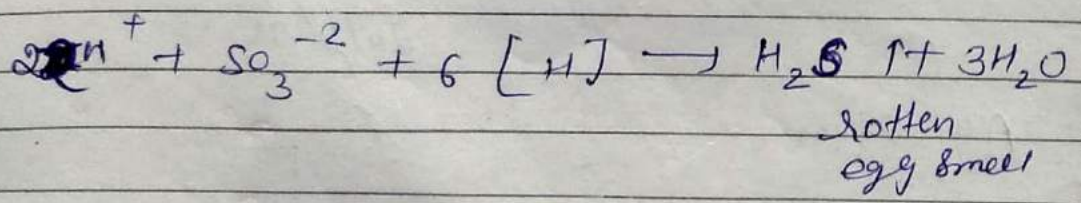
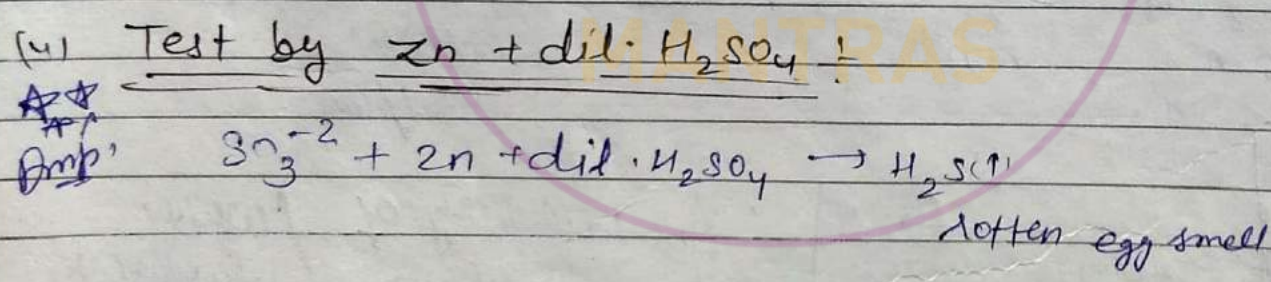


Ans: SO₂ act as oxidising as well as reducing agent
But H₂S only act as reducing agent



Note! Initial ppt is not obtained due to formation of soluble complex $[\text{Ag}(\text{SO}_3)]^-$.

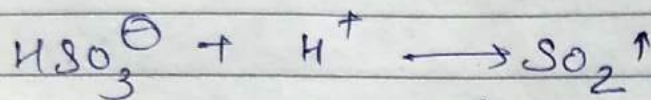
Ag₂O
 Black ppt of Ag is not soluble in NH_3 but Ag_2O is soluble of excess of NH_3 .



Test of
Bisulphide (HSO_3^-)

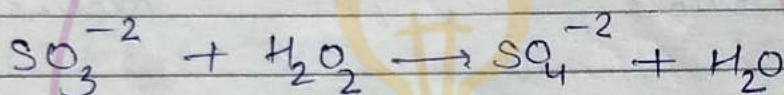
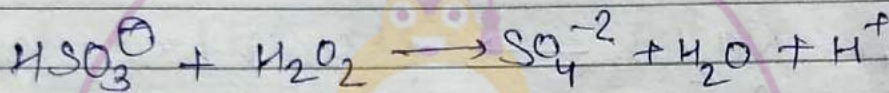
All Bisulphides ^{Salt} are water soluble

① by dil. HCl or dil H_2SO_4



(same observation obtained as SO_3^{2-})

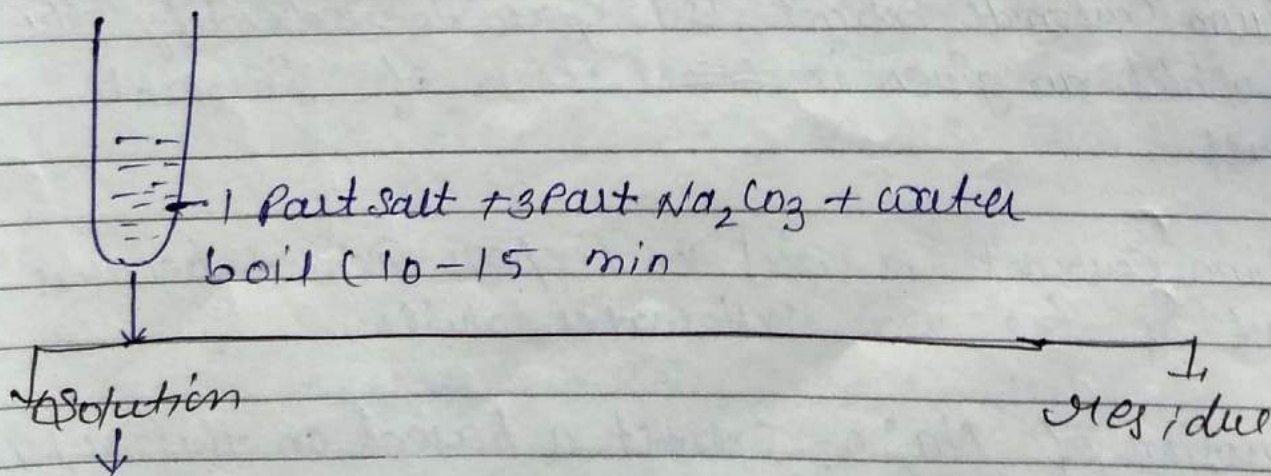
② test by H_2O_2



when H_2O_2 is treated with HSO_3^- , it produce acidic solⁿ and it turns blue litmus to Red

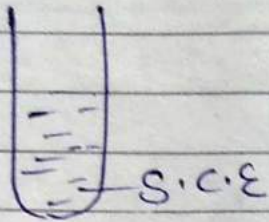
अम्ल
↑ ↓
Acid Blue Red.

* Preparation of Sodium Carbonate extract (S.C.E)

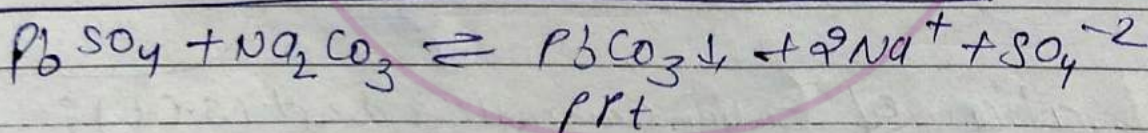
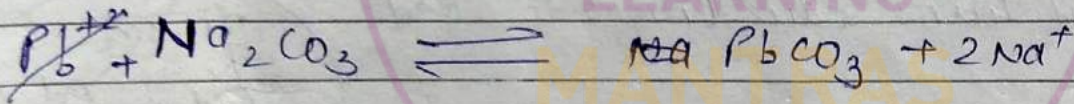
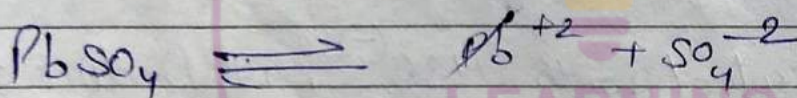
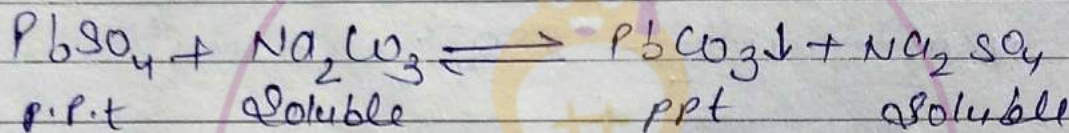


Solution
↓
Neutralisation of Na_2CO_3 by suitable acid

residue
↓



* PPT Conversion Rxn



⇒ Sodium Carbonate Extract is prepared to identify the anion which are given in soluble form of insoluble salt

⇒ Sodium carbonate is used to prepare extract because most of the Na salt water soluble

⇒ Formation of Na_2CO_3 extract is based on the principle of double decomposition rxn or ppt exchange rxn

or Ppt Conversion Rxn

⇒ excess of Na_2CO_3 present in extract must be neutralised by suitable acid before the identification of anion

~~***~~ Na_2CO_3 Extract

Sodium carbonate extract is used to identify for all anions except - carbonate and bicarbonate (bicarbonate 1st step $\xrightarrow{\text{heat}}$ CO_2 \uparrow carbonate produce CO_2)

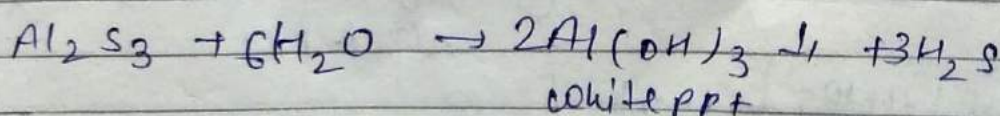
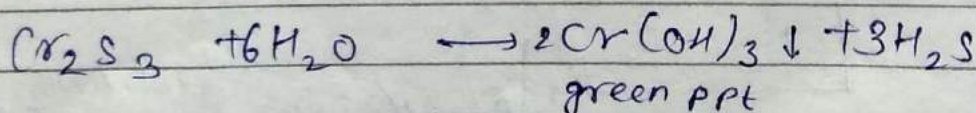
*) Test of sulphide ion (S^{2-}):

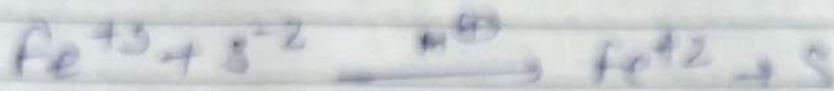
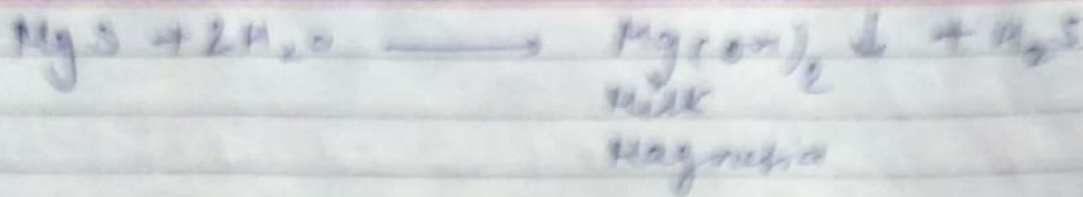
All sulphides are water insoluble except: IA sulphide, IIA sulphides ($\text{NH}_4)_2\text{S}$, (Al, Cr, Mg sulphide are completely hydrolysed).

Note:

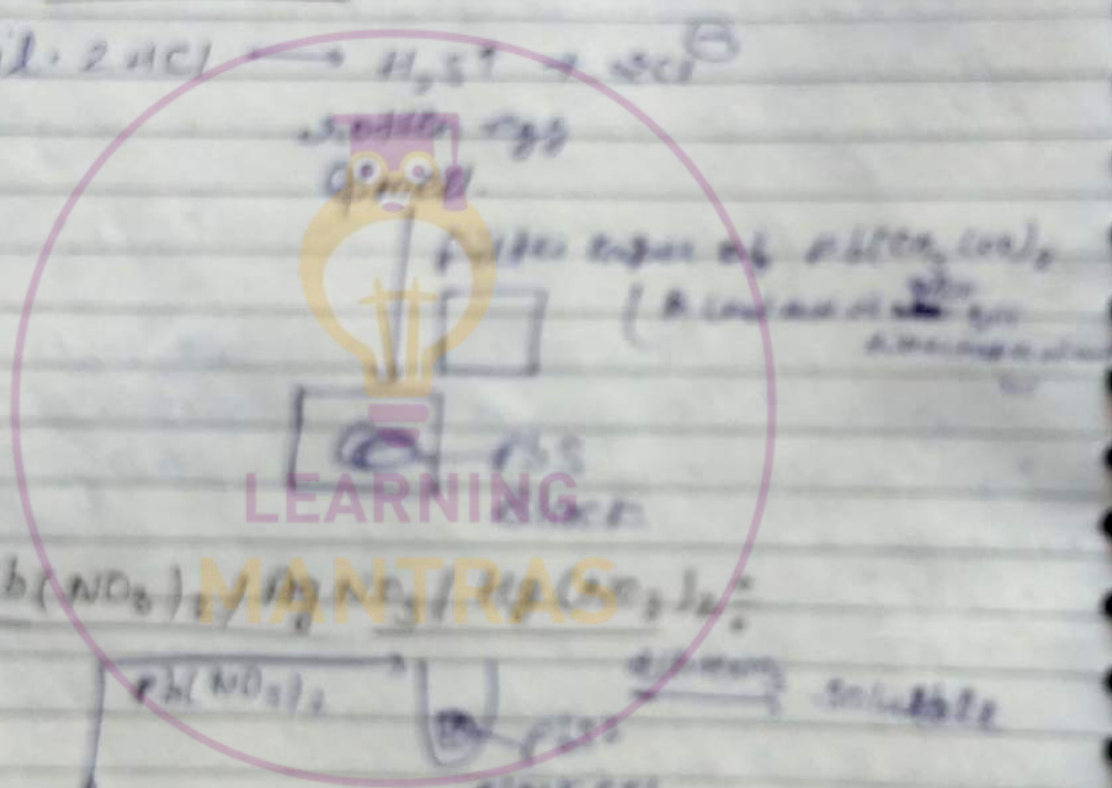
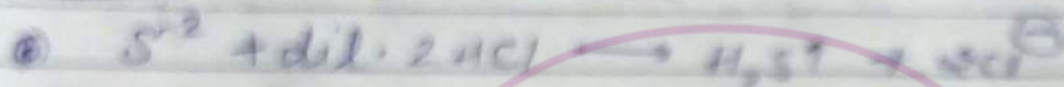
Cr_2S_3 , Al_2S_3 , MgS are exist in solid state (in anhydrous form). But they are easily hydrolysed in water

2) Fe_2S_3 exist in solid state and usually not soluble because in acidic medium it shows redox rxn and produce Fe^{2+} and Sulphur

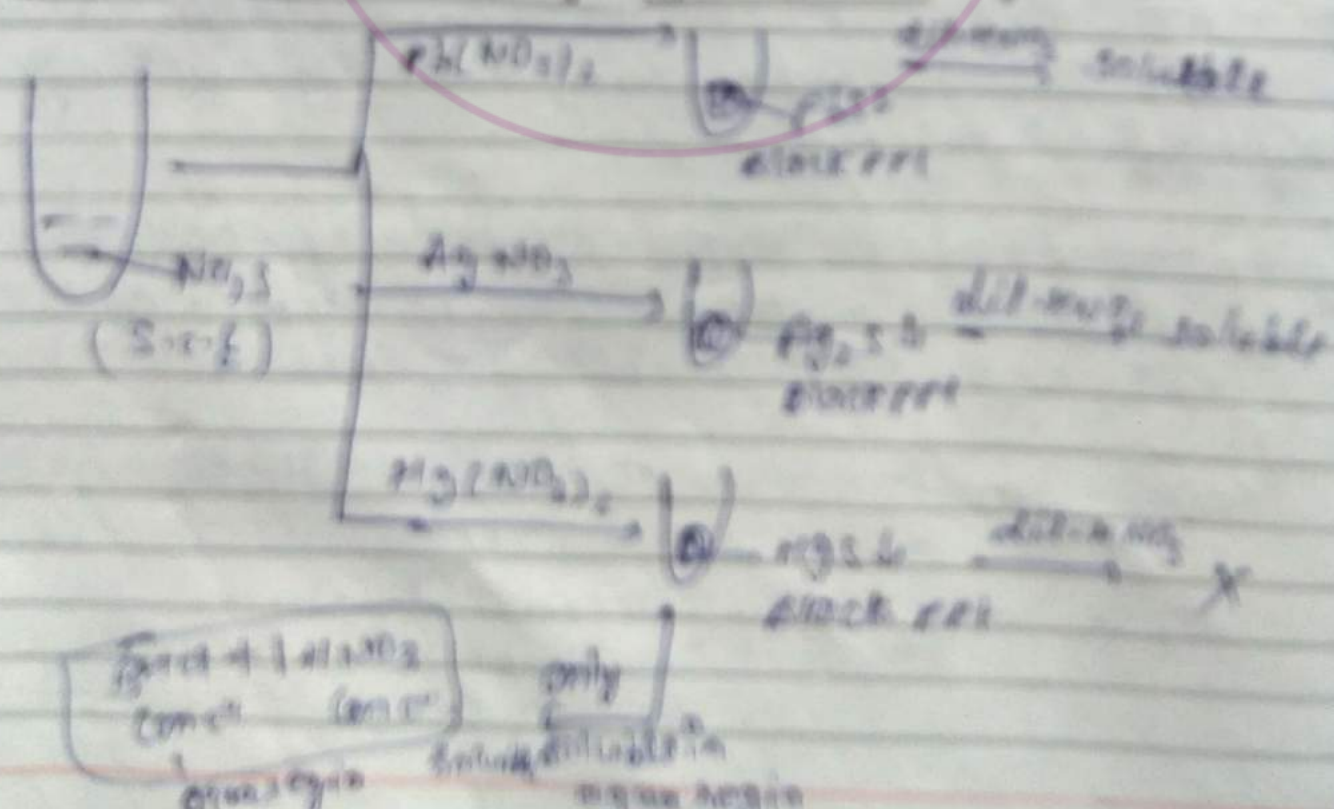




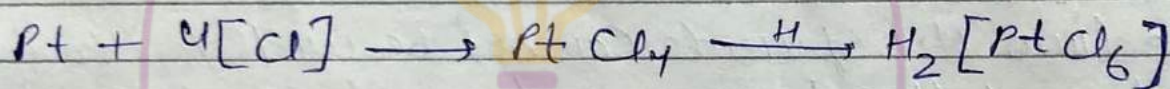
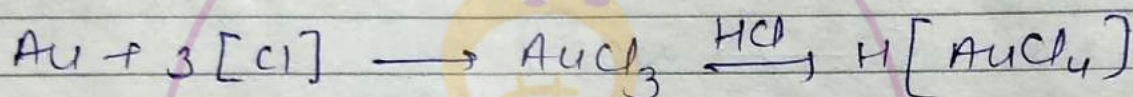
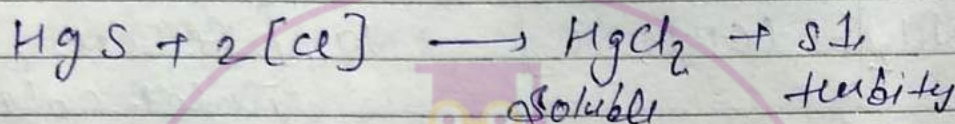
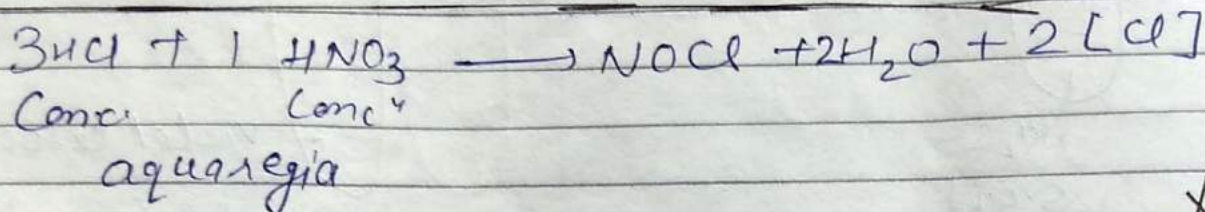
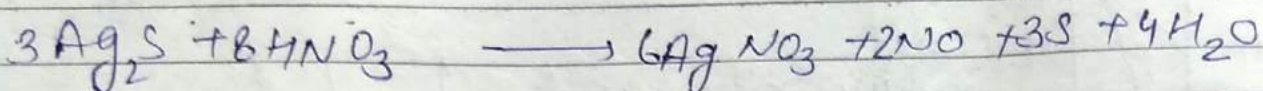
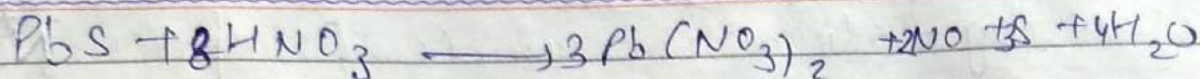
Test by dil. HCl / dil. H₂SO₄:



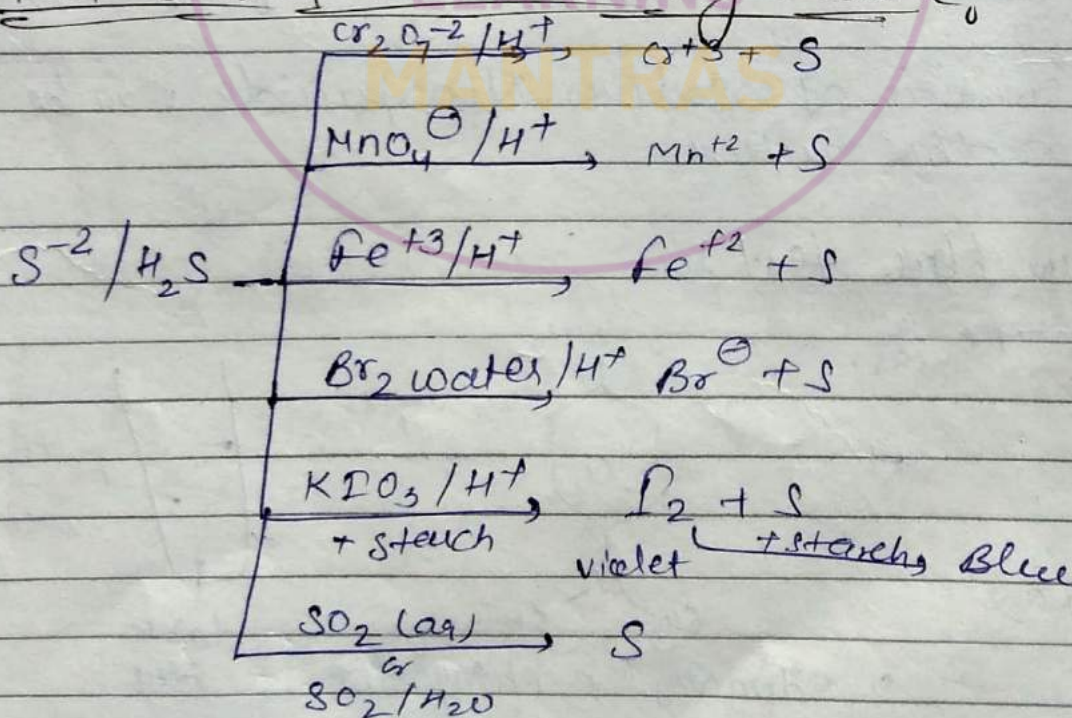
② Test by Pb(NO₃)₂ / Mg(NO₃)₂ / AgNO₃:



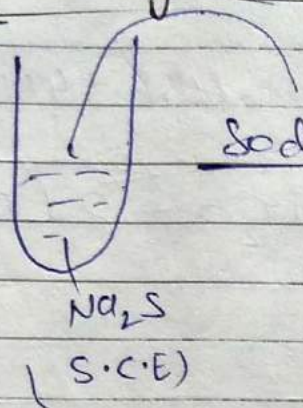
A



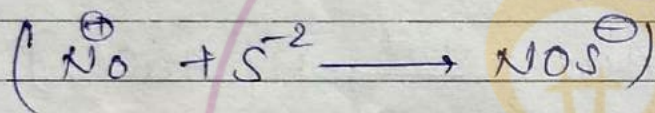
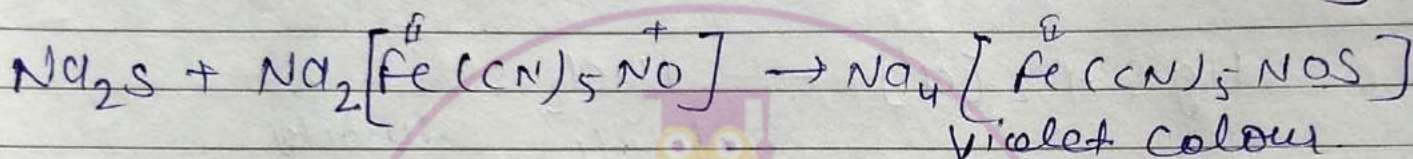
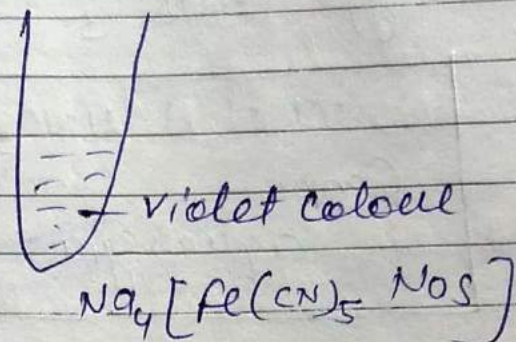
(3) Test based on Reducing Nature:



Test by Sodium Nitroprusside $[Na_2[Fe(CN)_5NO]]$
 Reddish Brown



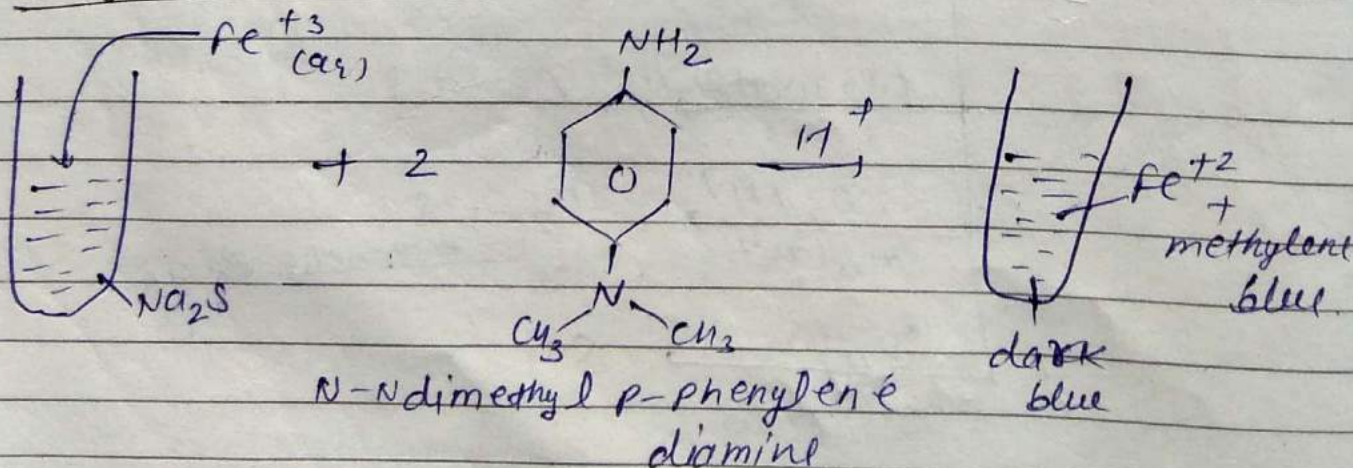
Sodium nitroprusside,

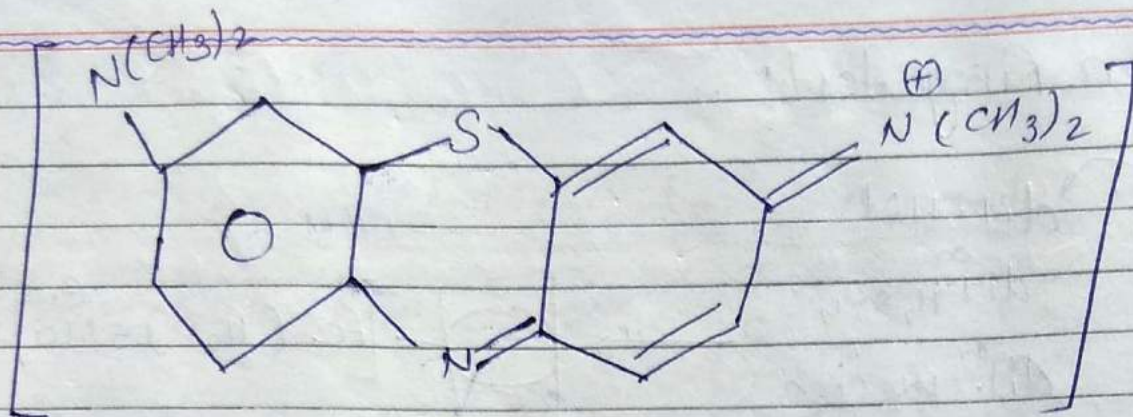


→ Sodium Nitroprusside can not be used for the identification of H₂S because it does not produce violet colour due to low dissociation of H₂S

Alkyl solution of sodium Nitroprusside can be used for this purpose

Methylene blue test

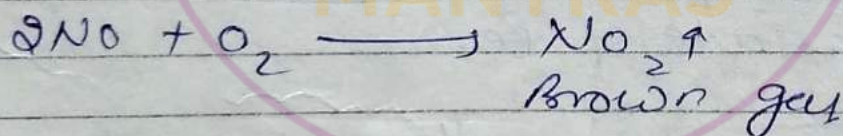
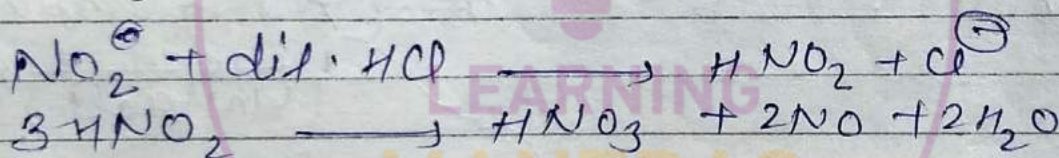




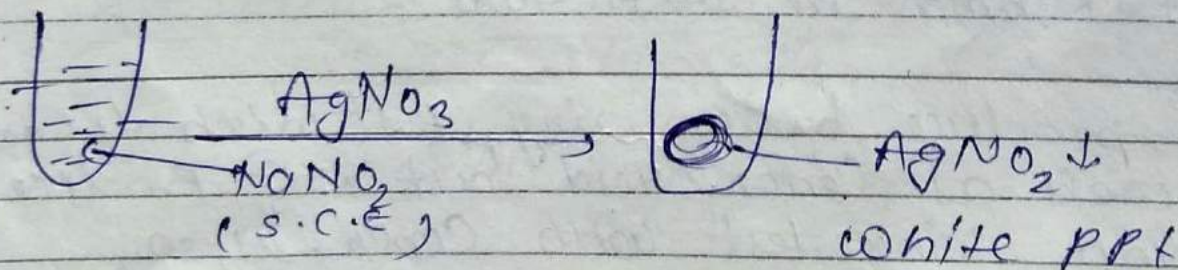
methylene blue
blue colour.

→ Test of Nitrite ion NO_2^-
All nitrite (NO_2^-) salts are water soluble
ex of AgNO_2

Test by dil. HCl / dil. H_2SO_4

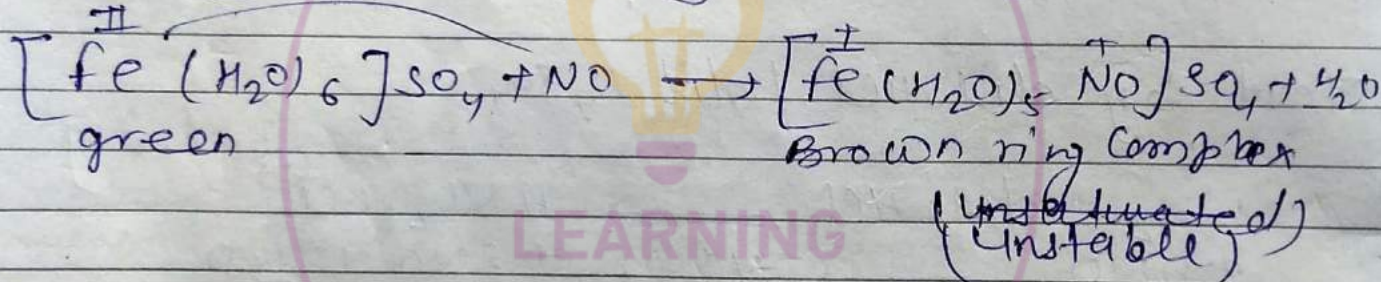
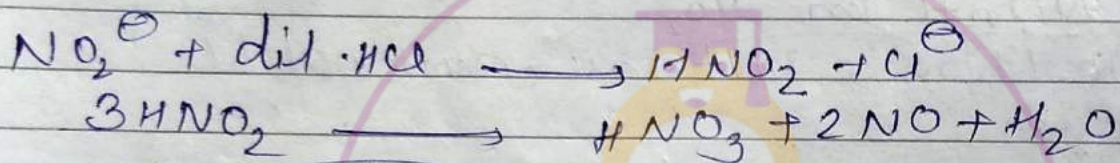
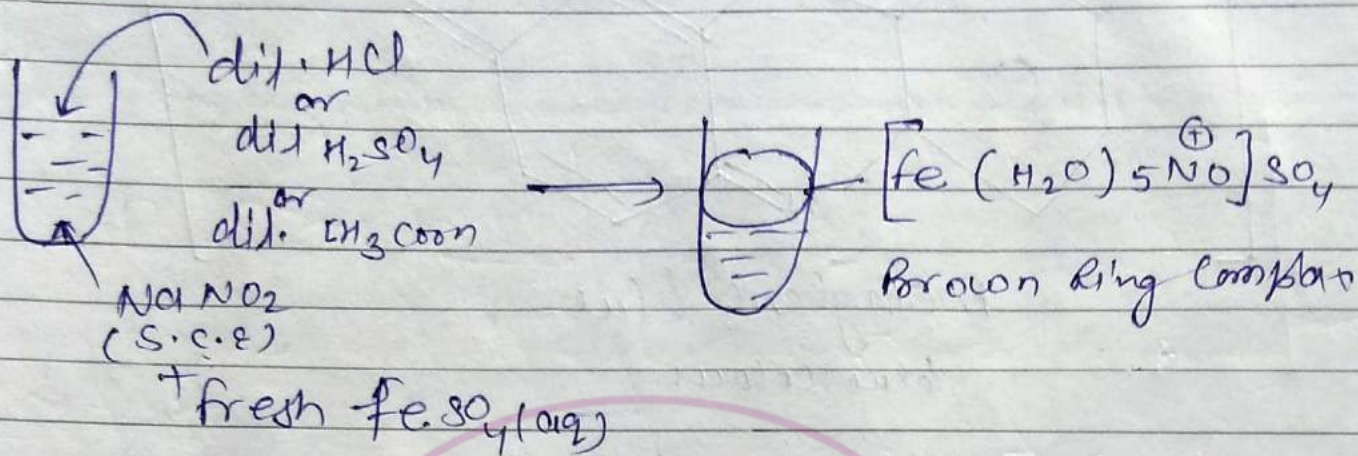


Test by AgNO_3



Dmp

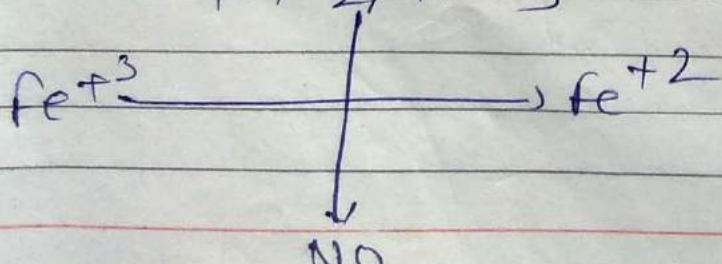
* Brown Ring Test



* Brown ring complex is unstable due to +1 oxidation state of Fe.

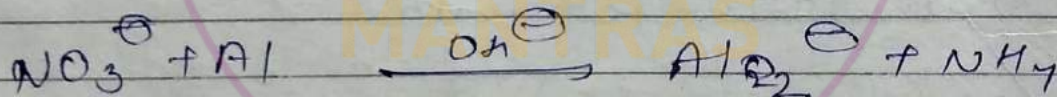
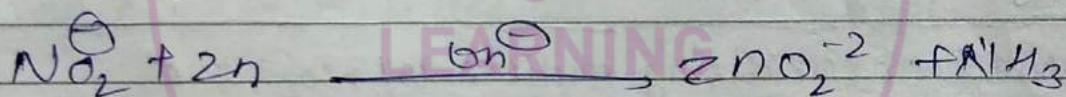
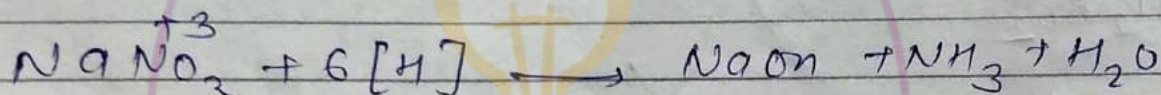
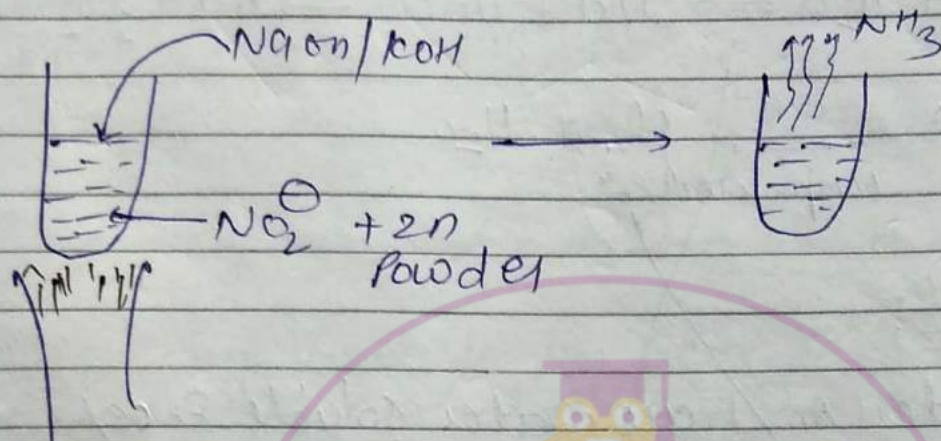
• on heating or shaking the test tube brown colour disappears and yellow solⁿ of Fe^{+3} left behind in test tube

• NO_2^- produce brown ring test with dil. acid, as well as concn. acid but NO_3^- produce brown ring test with concn. H_2SO_4



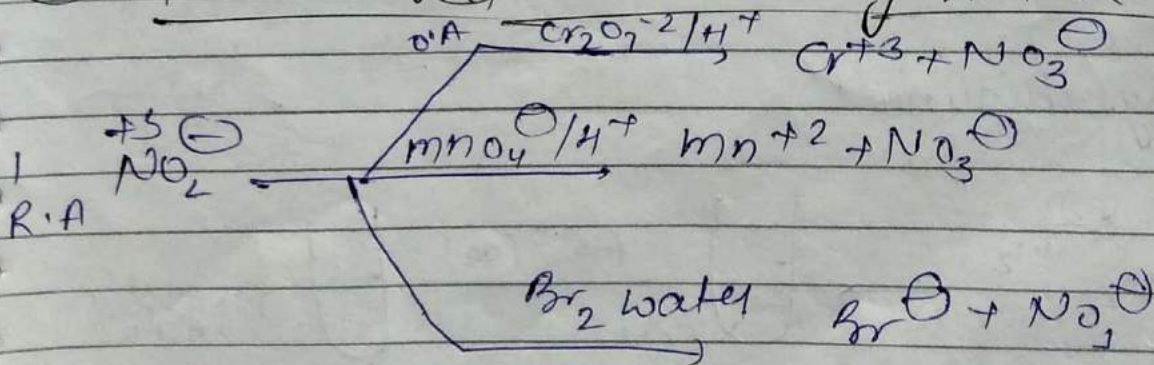
Imp

(4) Test by Zn/Al powder + NaOH/KOH!



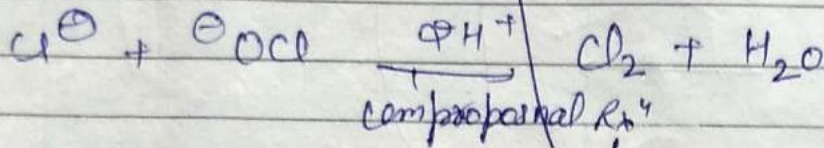
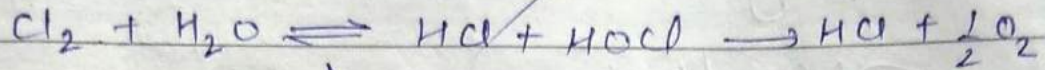
Note: same test is NO_3^-

(5) Test based on reducing nature of NO_2^-



(6) Layer test: This test is not applicable for Cl^-

Chlorine water:

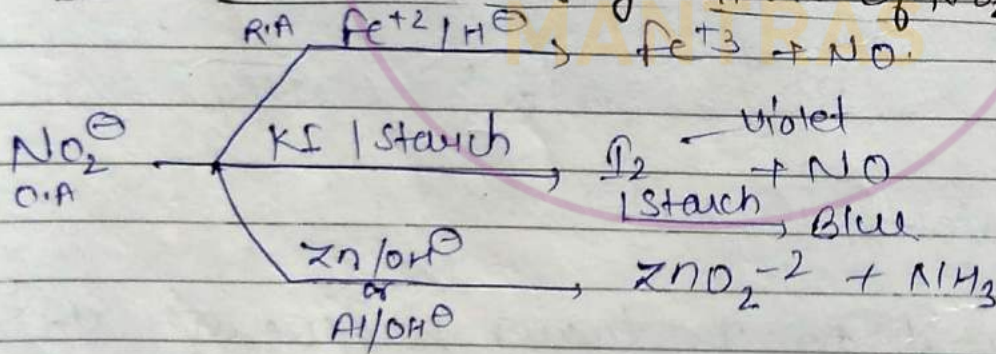


* Test of Br^- :

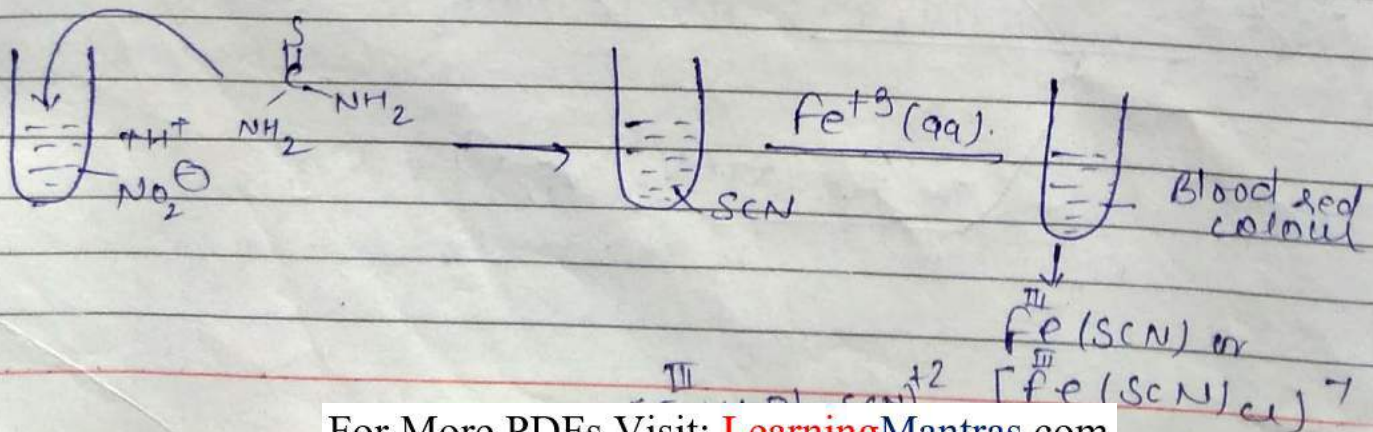
All bromides (Br^-) are water soluble except $AgBr$, $PbBr_2$ (soluble in boiled water), Hg_2Br_2 , Cu_2Br_2

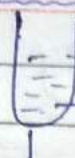
(i) Test by Conc. H_2SO_4

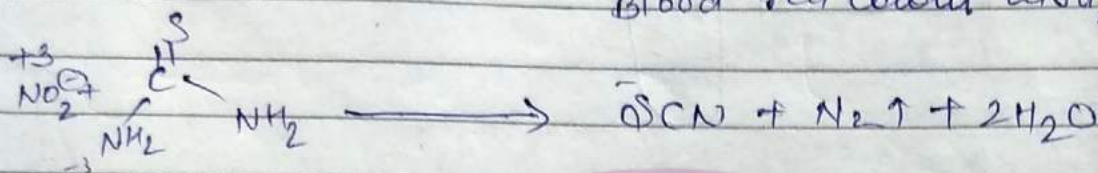
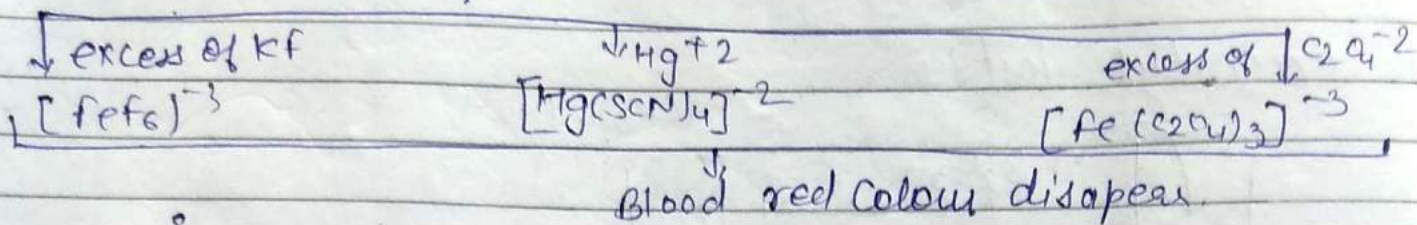
(6) Test based on oxidising nature of NO_2^- :



(7) Test by thiocyanic acid:



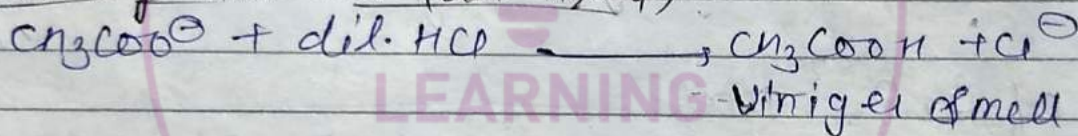
 Blood red



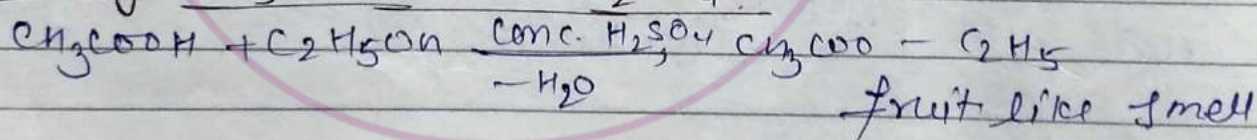
⑦ Test by Acetate ion (CH_3COO^-) :-

All acetate (CH_3COO^-) salt are water soluble except CH_3COOAg (s.s), $(CH_3COO)_2Cu$, $(CH_3COO)_2Hg$ (s.s) some basic acetates eg. those of Fe, Al, and Cr are insoluble in water

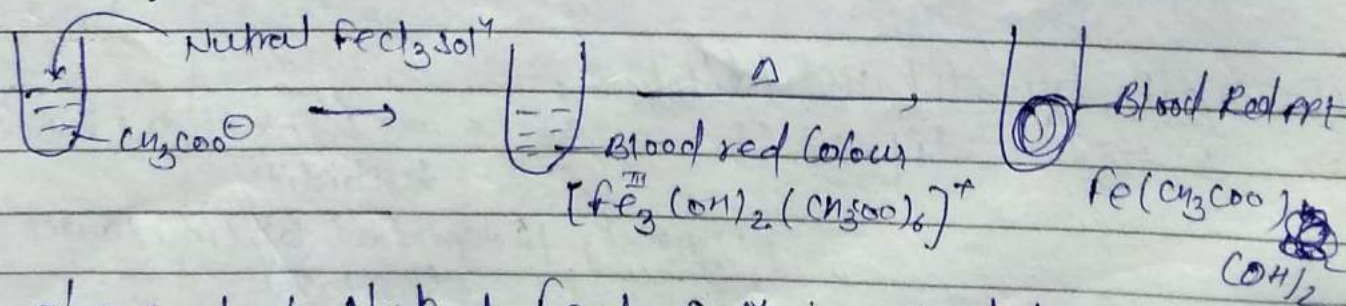
① Test by dil. HCl (dil. H_2SO_4) :-



② Test by C_2H_5OH + Conc. H_2SO_4 :-



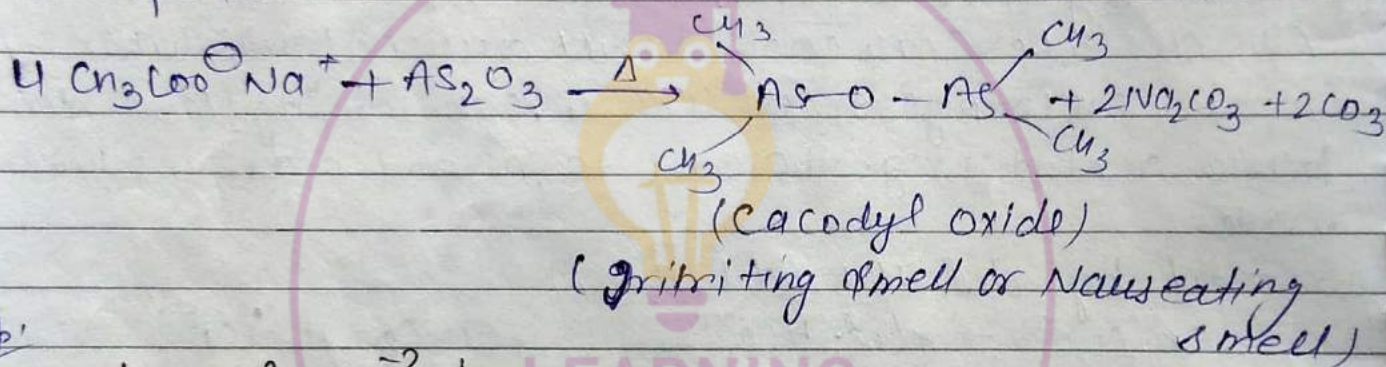
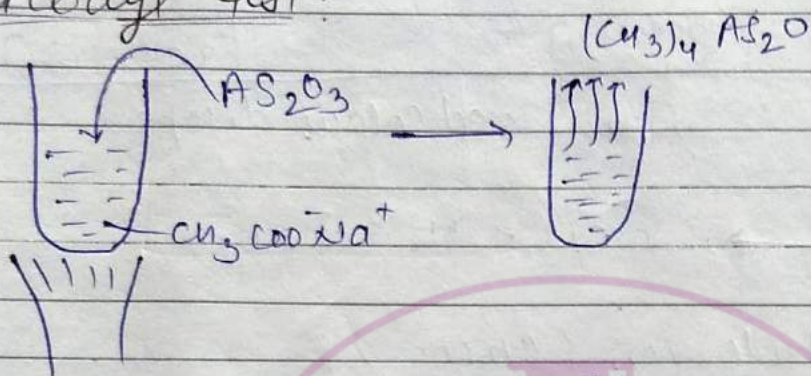
③ Test by Neutral $FeCl_3$:-



In above test Neutral $FeCl_3$ solⁿ is used because in acidic medium acetate ion are protonated to acetic acid

* Neutral fecl₃ solⁿ is formed by by suitable amount of NH₄OH.

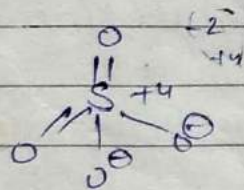
(4) Cacodyl test:



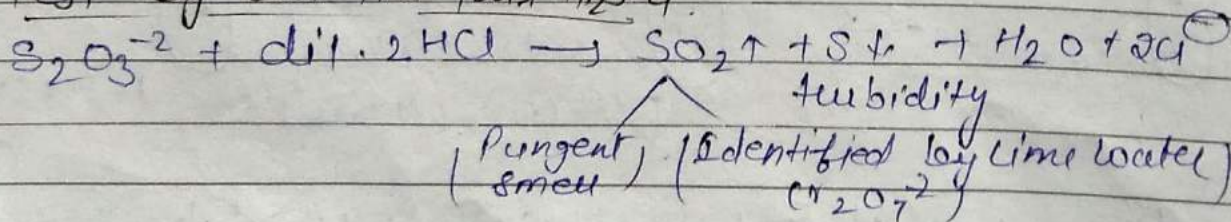
Prob:

* Test of S₂O₃⁻² ion:

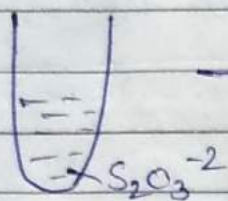
S₂O₃⁻² ⇒ most of the thio sulphates those have been prepared are soluble in water Ag⁺², Pb⁺² and Ba⁺² (S.S).
Mg⁺², Bi⁺³, Li⁺ = insoluble



① Test by dil HCl / dil H₂SO₄:



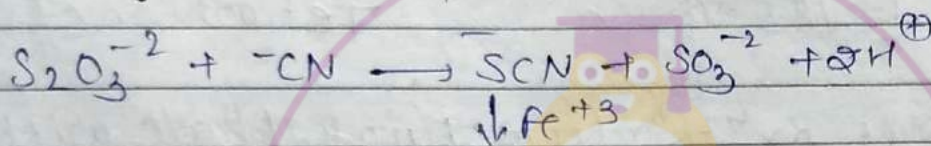
② Test by CaCl_2 or BaCl_2 :



CaCl_2 NO PPT CaS_2O_3

BaCl_2 , $\text{BaS}_2\text{O}_3 \downarrow$
white PPT

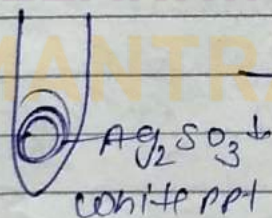
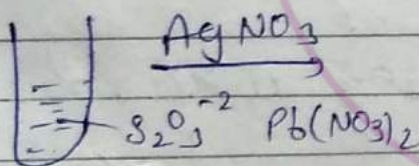
Test by CN^- and followed $\text{Fe}^{+3} / \text{FeCl}_3$ solution



Blood red colour
 $\text{Fe}(\text{SCN})_3$

Test by $\text{AgNO}_3 / \text{Pb}(\text{NO}_3)_2$:

excess of $\text{NO}_2\text{S}_2\text{O}_3$ $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{-3}$
soluble

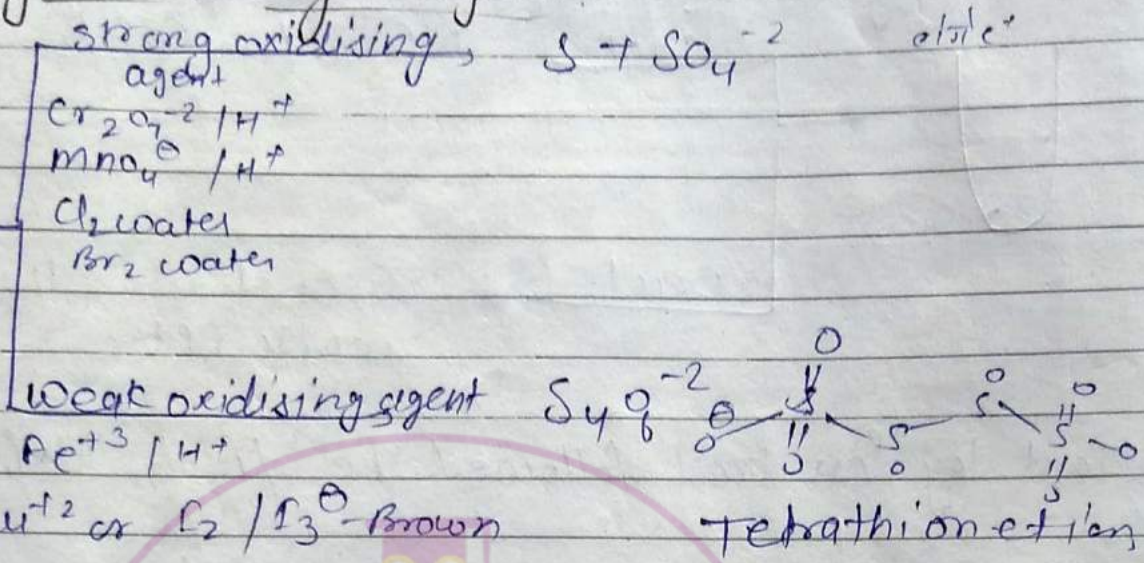
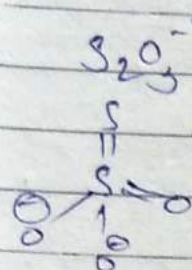


boiling
or
standing
 $+ \text{H}_2\text{O}$ $\text{Ag}_2\text{S} \downarrow + \text{SO}_4^{-2} + 2\text{H}^+$
black ppt

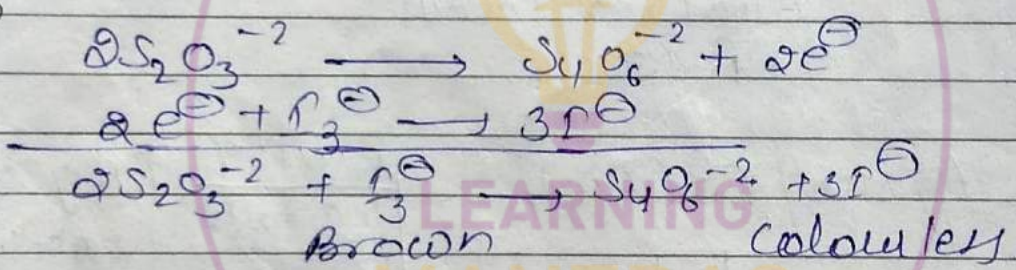
| | | | |
|----------------------------|---|--------------------------------------|--|
| $\text{Pb}(\text{NO}_3)_2$ | $\text{PbS}_2\text{O}_3 \downarrow$ white ppt | $\text{PbS} \downarrow$ black ppt | $[\text{Pb}(\text{S}_2\text{O}_3)_2]^{-2}$ |
| $\text{Hg}(\text{NO}_3)_2$ | $\text{HgS}_2\text{O}_3 \downarrow$ white ppt | $\text{HgS} \downarrow$ black ppt | $[\text{Hg}(\text{S}_2\text{O}_3)_2]^{-2}$ |
| $\text{Bi}(\text{NO}_3)_3$ | $\text{Bi}_2(\text{S}_2\text{O}_3)_3 \downarrow$ white ppt | Bi_2S_3 brown ppt | $[\text{Bi}(\text{S}_2\text{O}_3)_2]^{-3}$ |

⑤ Test by oxidising agent

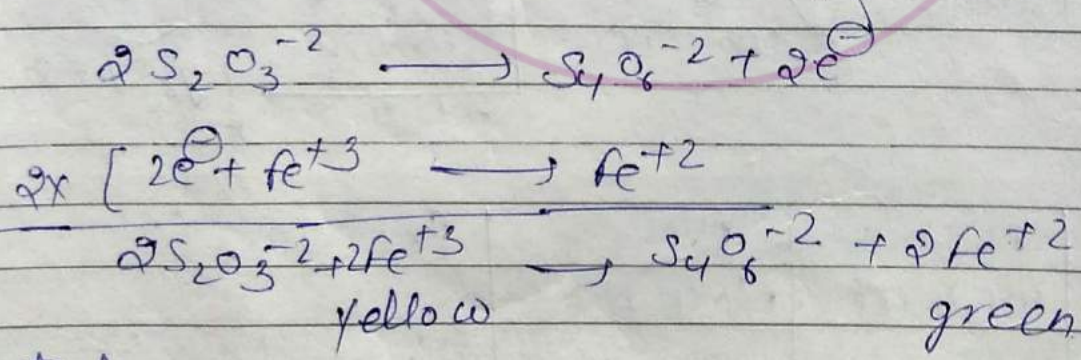
Learn



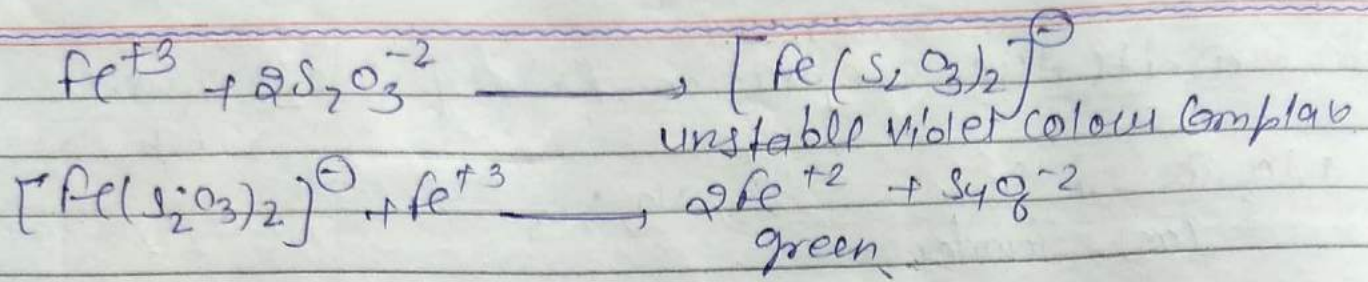
Q. write the balanced Rxn of Sodium tetrathionate with I_3^-



Q. write the balanced Rxn of $S_2O_3^{-2}$ with Fe^{+3}

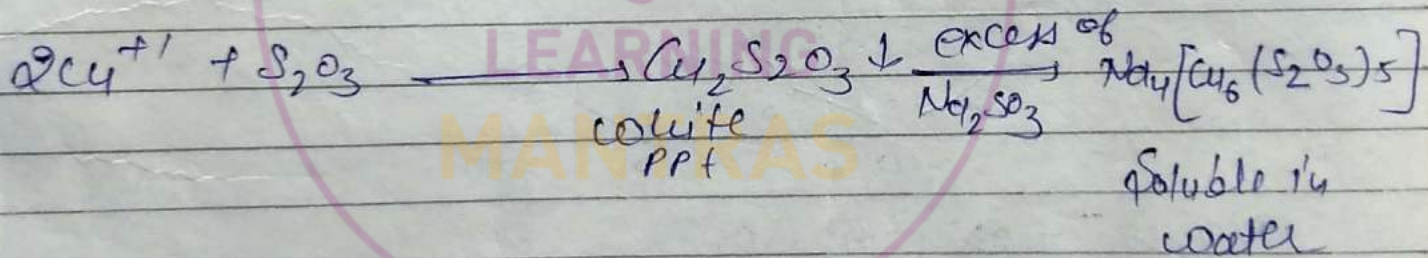
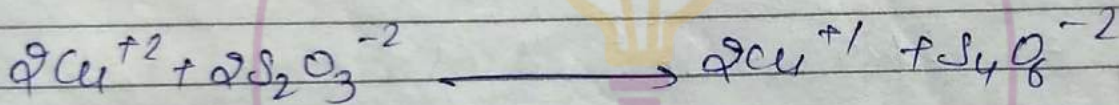
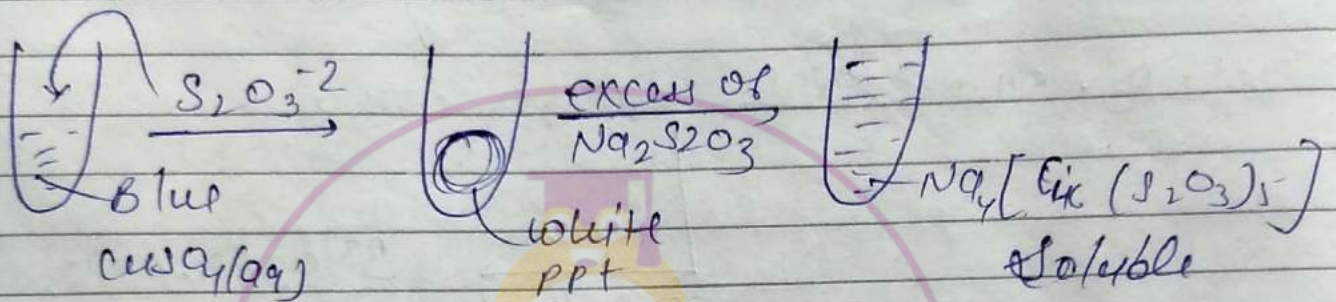


Note! when $Na_2S_2O_3$ added in yellow solⁿ of Fe^{+3} unstable violet colour is produce after some time this violet colour is change to green solⁿ of Fe^{+2} due to redox Rxn.

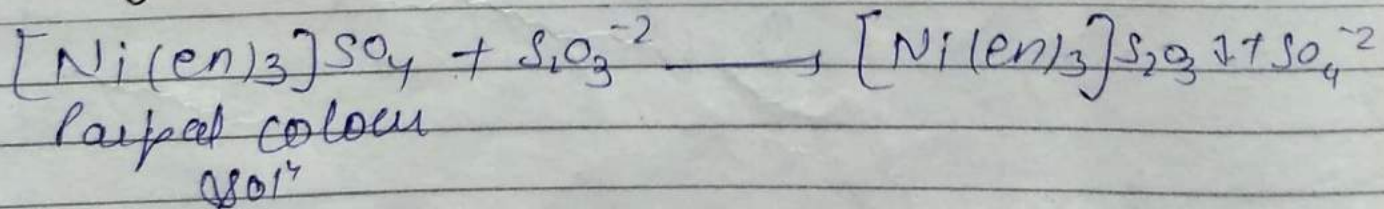


Q. 1

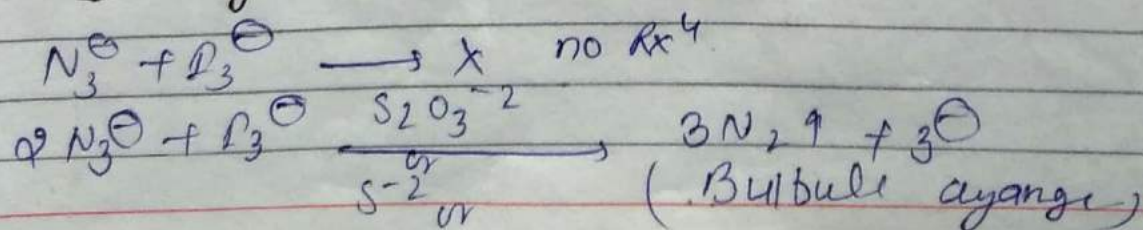
Ques! what happen when $\text{Na}_2\text{S}_2\text{O}_3$ in CuSO_4 solⁿ



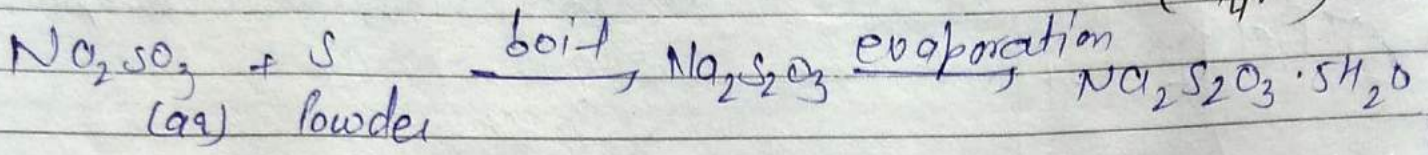
Test by $[\text{Ni}(\text{en})_3]\text{SO}_4$.



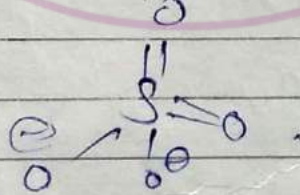
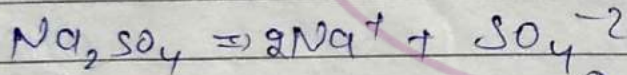
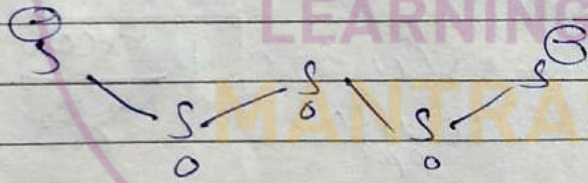
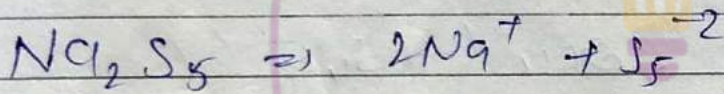
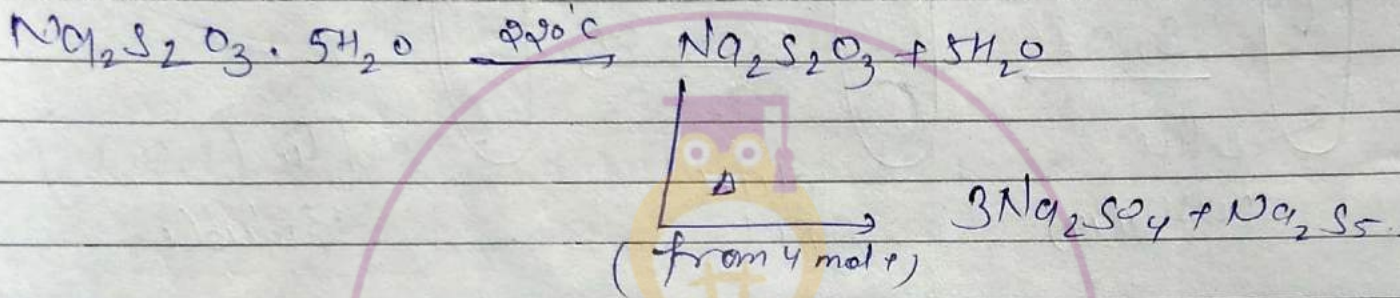
⑦ catalyst test:



⑧ Write the Preparation Rxn of $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ (H₄PO)



Q. Write the heating of $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ and draw structure of salt which are formed by heating.



Class - I

Subgroup II :

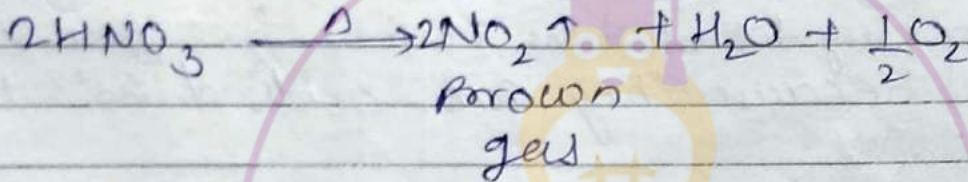
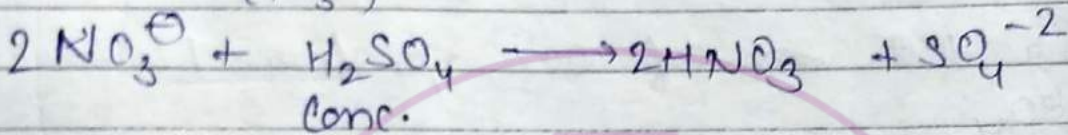
(~~iron~~ H_2SO_4)

Test of

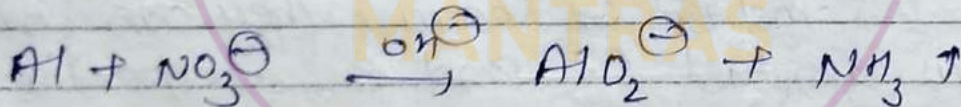
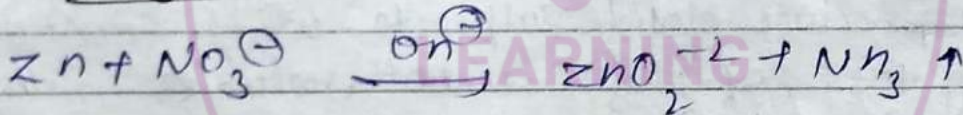
(1) NO_3^- ion

(i) Test by Conc. H_2SO_4 :

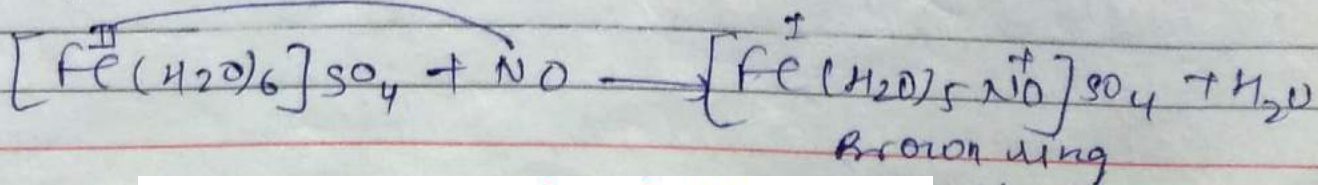
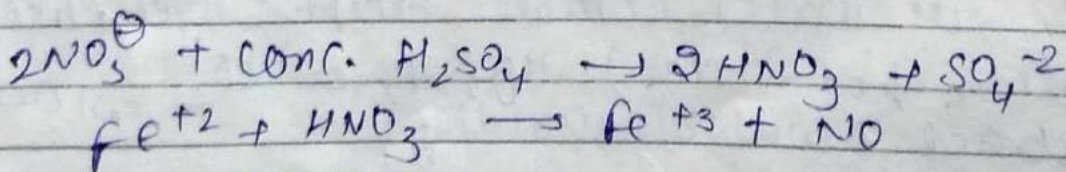
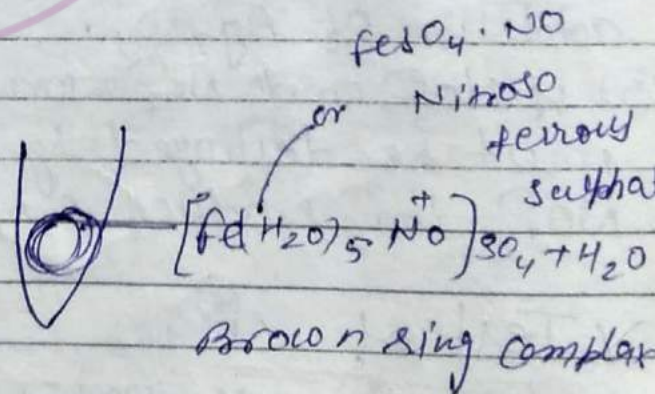
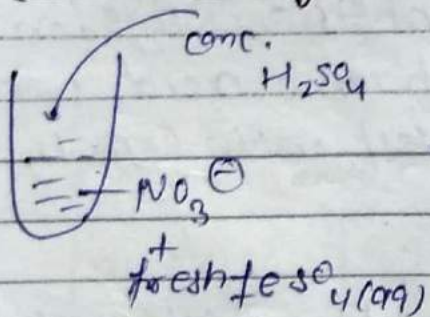
All nitrate are water soluble
(NO_3^-)

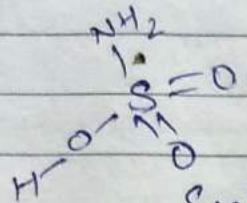
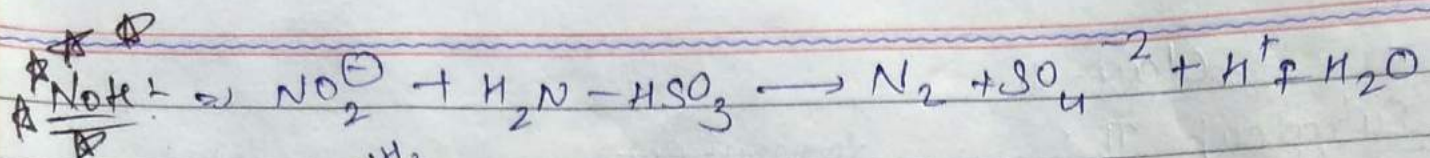


(2) Test by Zn/Al powder + NaOH/KOH :

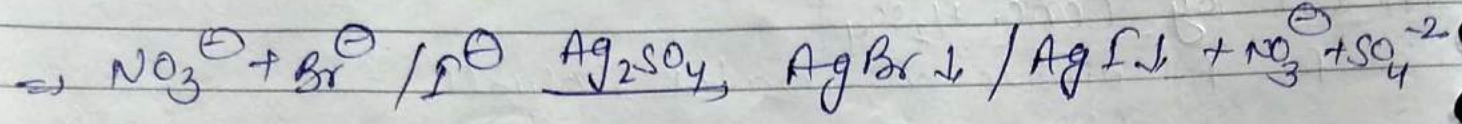


(3) Brown Ring test :





Sulphamic acid

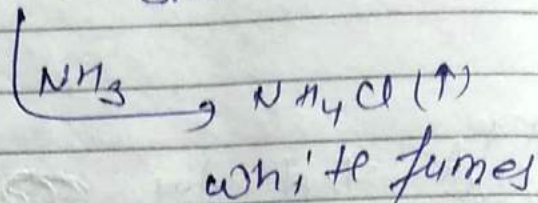
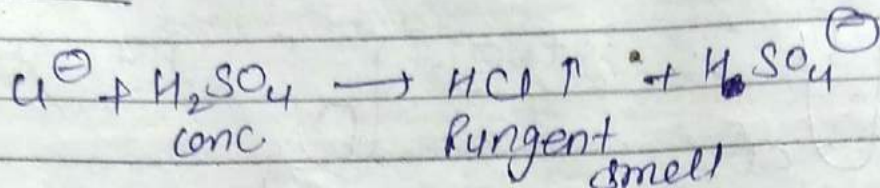
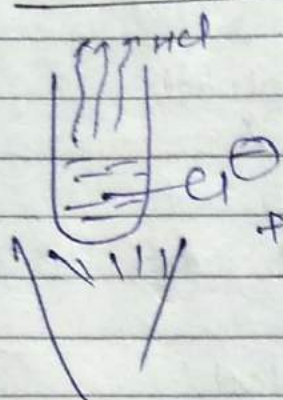


- ① Brown ring test with of NO_3^- preferred with conc. H_2SO_4
- ② during Brown ring test test tube must be free from strong oxidising ions. because they can oxidise Fe^{+2} to Fe^{+3}
- ③ Test tube must be free from cations which form insoluble sulphate for ex: $\text{Ba}^{+2}, \text{Sr}^{+2}, \text{Ca}^{+2}, \text{Pb}^{+2}$ etc because they produce solid sulphate with conc. H_2SO_4
- ④ Brown ring test of NO_3^- is not reliable in the presence of I^- and Br^- because they can produce brown colour product I_3^- and Br_2 respectively with conc. H_2SO_4 . So, that they are removed by the addition of Ag_2SO_4 .
- ⑤ if NO_3^- and NO_2^- ions are present then NO_2^- ion must be destroyed by using sulphamic acid because NO_2^- ion produce brown ring test with conc. H_2SO_4

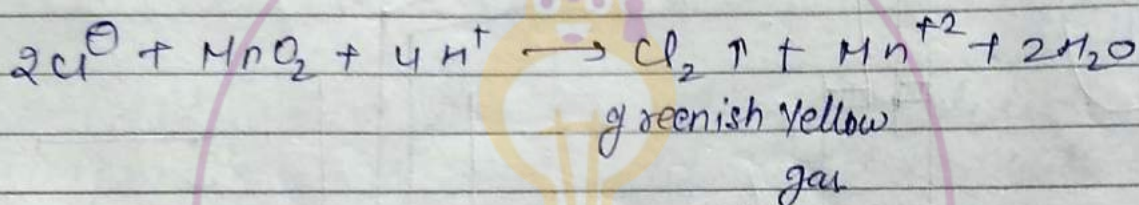
✶ Test of Cl^- :

All Cl^- are water soluble except - $\text{AgCl}, \text{PbCl}_2$ (soluble in hot water), $\text{Hg}_2\text{Cl}_2, \text{Cu}_2\text{Cl}_2, \text{BiOCl}$, and SbOCl (white turbidity)

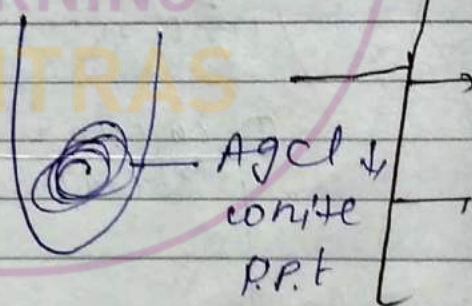
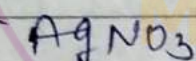
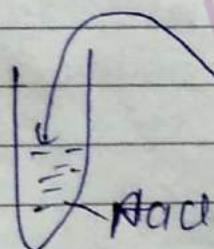
① Test by Conc. H_2SO_4 !



② Test by MnO_2 + Conc. H_2SO_4 !



③ Test by $AgNO_3$!



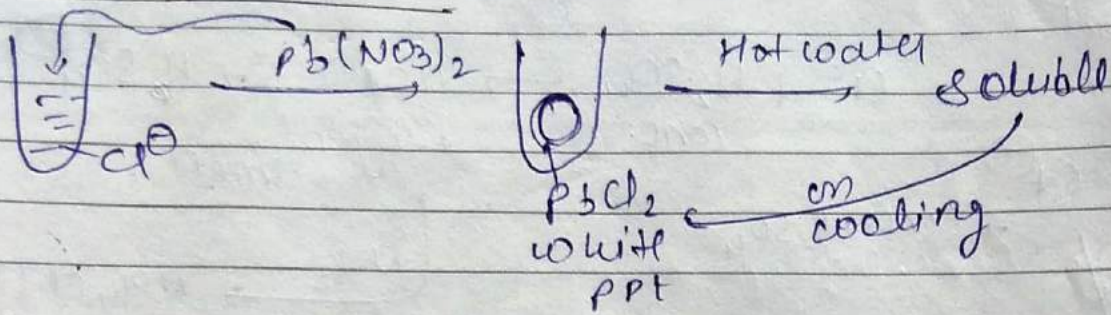
dil. HNO_3 X

NH_3 excess or NH_4OH excess $[Ag(NH_3)_2]^+$ soluble

excess of $S_2O_3^{2-}$ $[Ag(S_2O_3)_2]^{-3}$ soluble

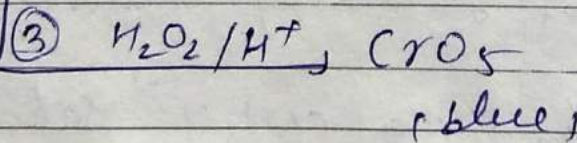
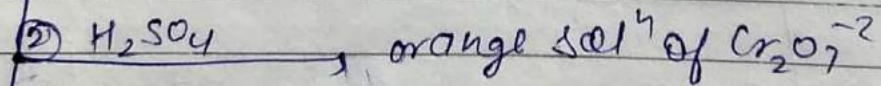
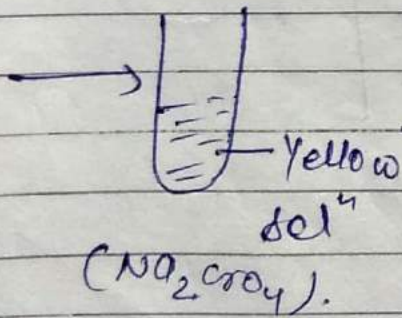
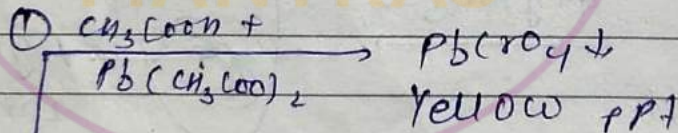
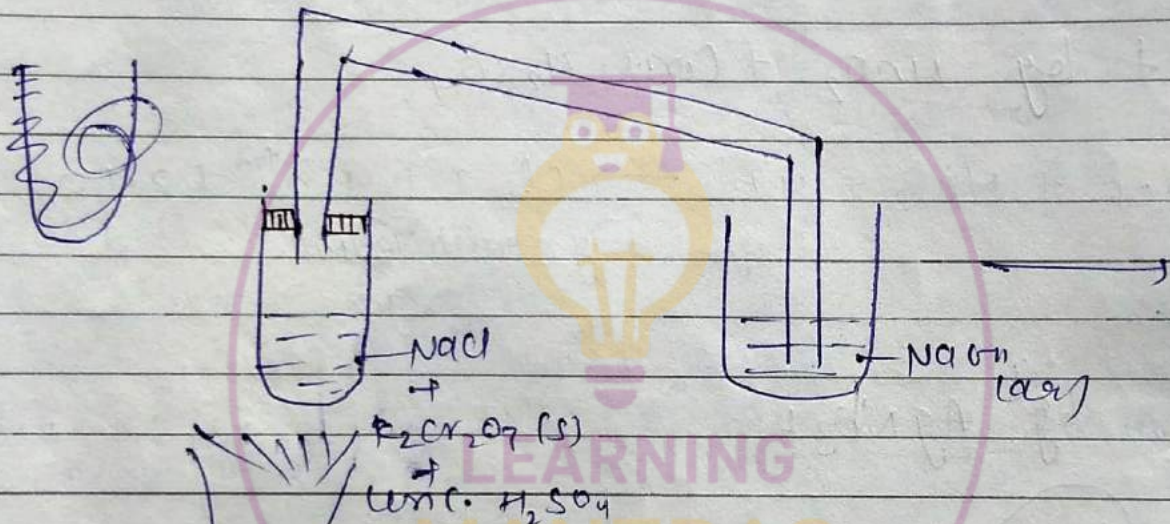
excess of CN^- $[Ag(CN)_2]^-$ soluble

④ Test by $Pb(NO_3)_2$

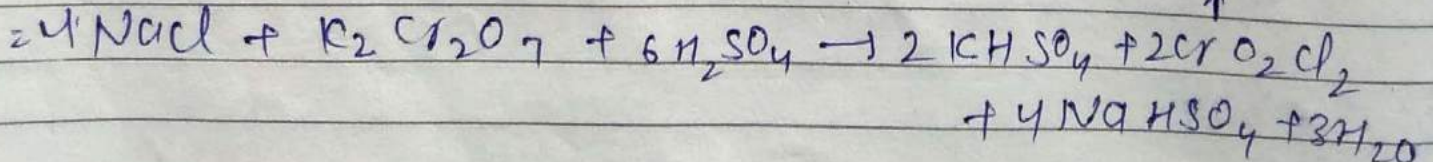


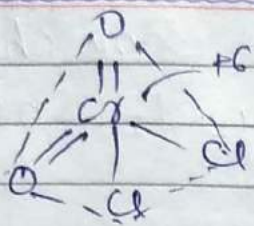
★★★
⑤
★★★

Test by ~~chromyl~~ chromyl chloride test!

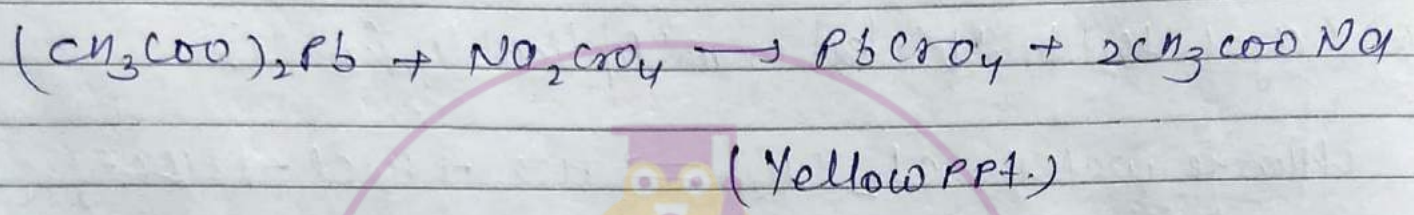
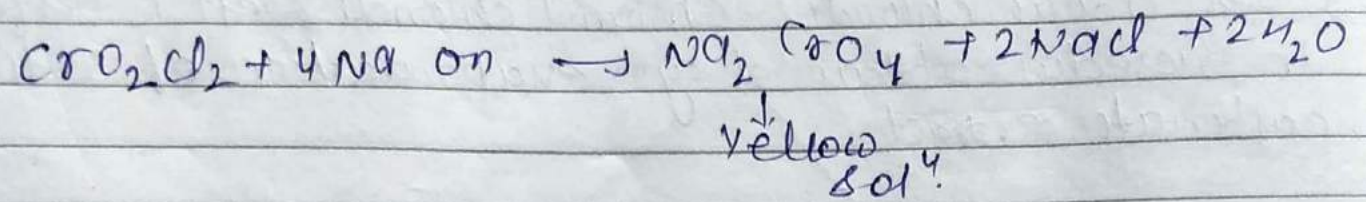


deep red solution
chromyl chloride

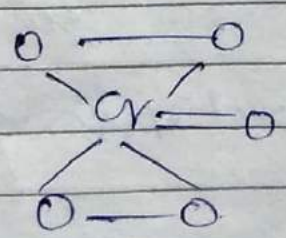
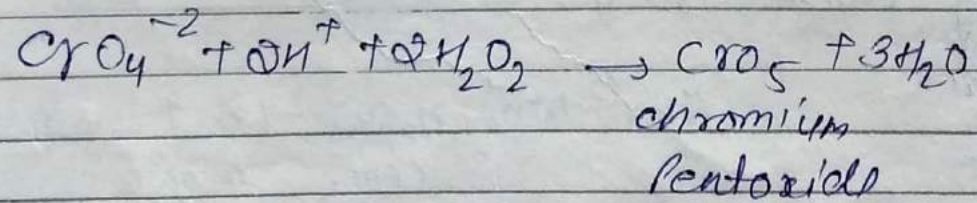




(d^3s) hybridisation
tetrahedral,



3) Acidify the ~~second~~ ^{third} part with dilute sulphuric acid and add small amounts of amyl alcohol and then 1 ml of 10% hydrogen peroxide solution. on gentle shaking ~~orange~~ organic layer turns blue. CrO_4^{2-} ion formed in the reaction of chromyl chloride with sodium hydroxide reacts with hydrogen peroxide to form chromium pentoxide (CrO_5), which dissolves in amyl alcohol to give blue colour.



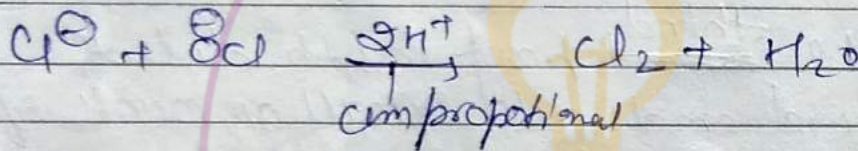
Ex: 13, 1 to 7
8, 9, 12, 13, 14, 15, 16, 17

heating effect

Note: This test is not applicable for some chlorides like
 $HgCl_2$, Hg_2Cl_2 , $BiCl_3$, Cu_2Cl_2 , $SnCl_4$, $AgCl$
 $PbCl_2$, $PbCl_4$

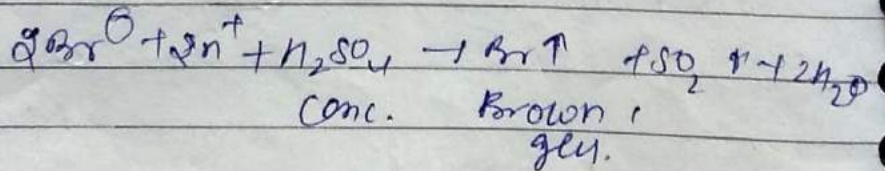
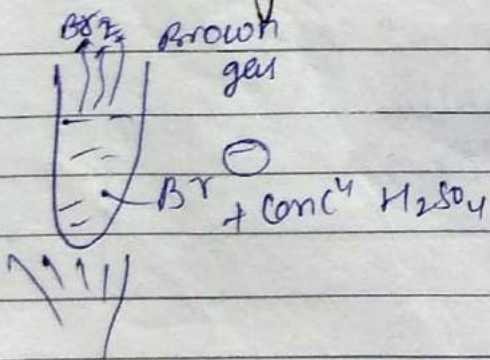
(2) For above chlorides chromyl chloride test is performed in residue obtained by evaporation of sodium carbonate extract.

(6) Cayer test: This test is not applicable for Cl^-



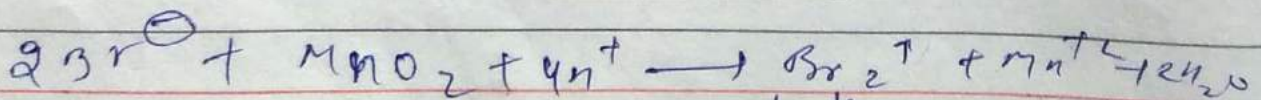
* Test of Br^- : All Br^- are water soluble except $AgBr$, $PbBr_2$ (soluble in boiled water), Hg_2Br_2 , Cu_2Br_2

(1) Test by concn. H_2SO_4

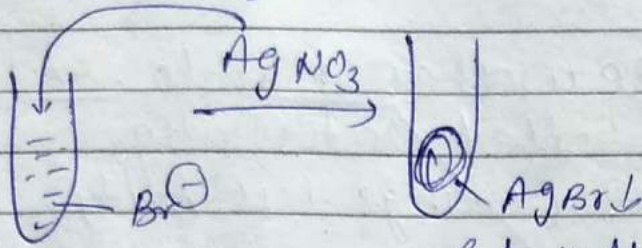


(Some amount of Br_2 is obtained)

(2) Test by HNO_2 + Conc H_2SO_4



(3) test by AgNO_3 :-



Pale yellow ppt

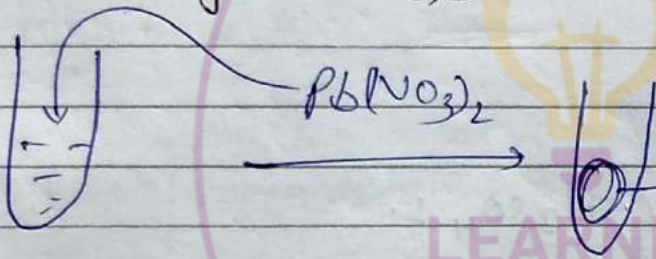
~~dil HNO_3~~

excess of NH_3 $\rightarrow [\text{Ag}(\text{NH}_3)_2]^+$
soluble

excess of $\text{S}_2\text{O}_3^{2-}$ $\rightarrow [\text{Ag}(\text{S}_2\text{O}_3)_2]^{3-}$
(Thio Sulphate) soluble

excess of CN^- $\rightarrow [\text{Ag}(\text{CN})_2]^-$
soluble

(4) Test by $\text{Pb}(\text{NO}_3)_2$:-

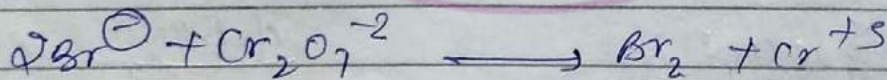


white ppt

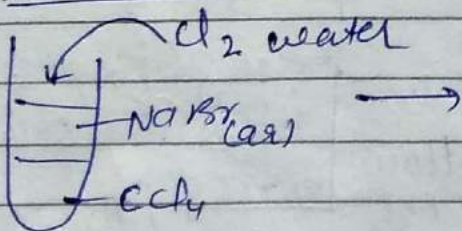
hot water soluble

on cooling

(5) test by $\text{K}_2\text{Cr}_2\text{O}_7$:-

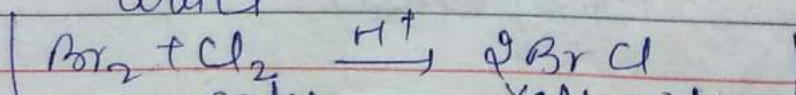
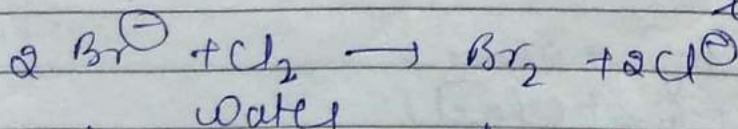


(6) layer test.



Brown

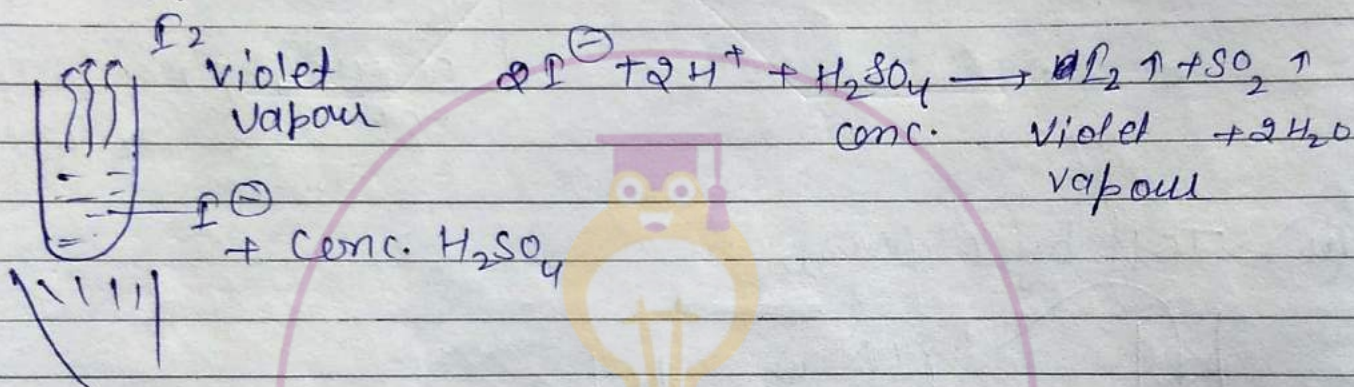
layer (Br_2)



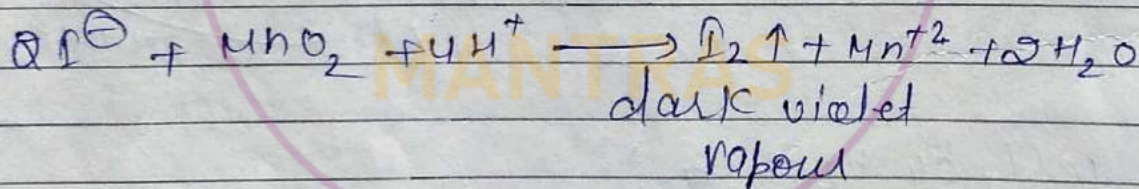
* Test of I^- :

All Iodides (I^-) are water soluble. Except -
 AgI , PbI_2 (soluble in boiled water), Hg_2I_2 , HgI_2 ,
 Cu_2I_2 , BiI_3 , $BiOI$ (orange turbidity).

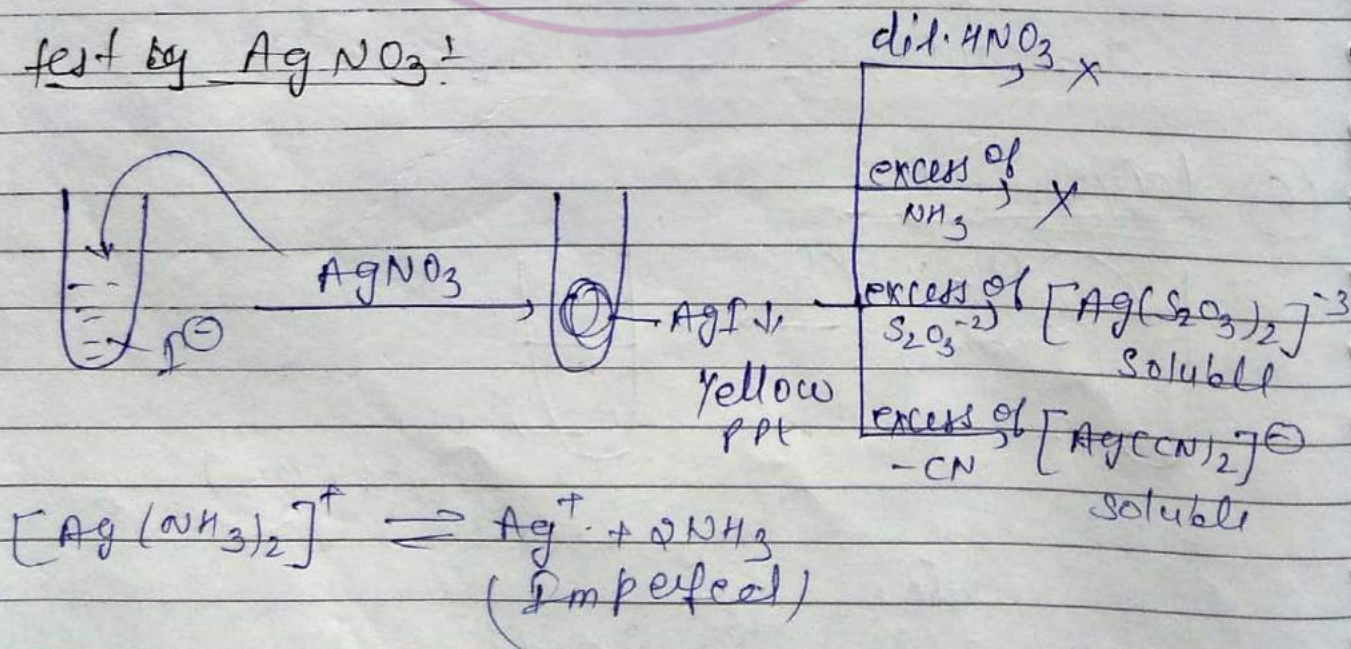
① test by Conc. H_2SO_4 :



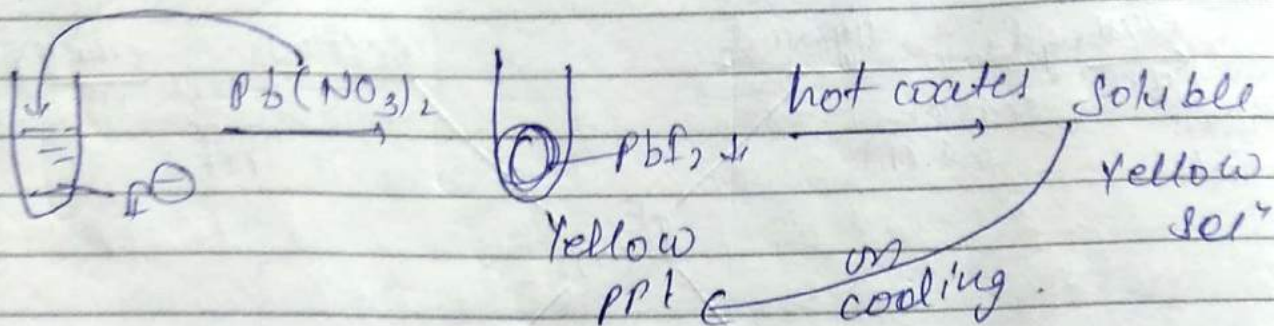
② test by MnO_2 + Conc. H_2SO_4 :



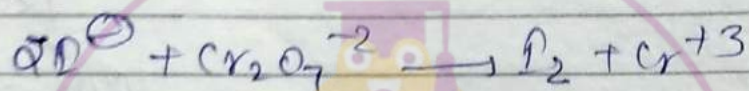
③ test by $AgNO_3$:



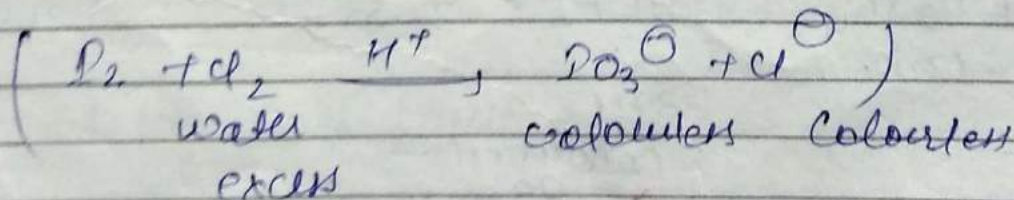
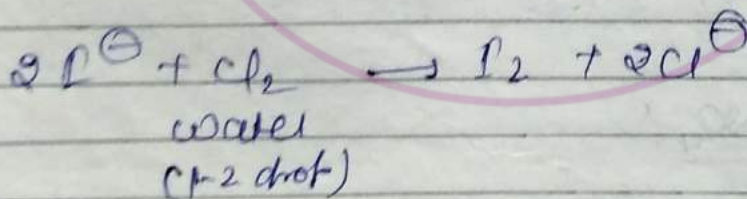
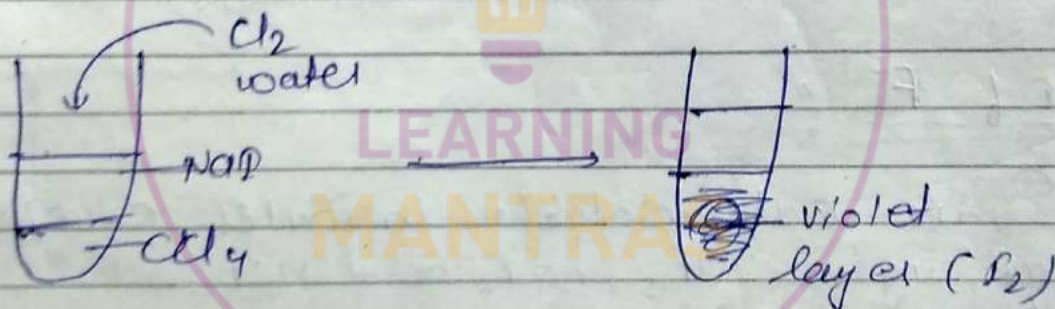
④ test by $Pb(NO_3)_2$ ⇒



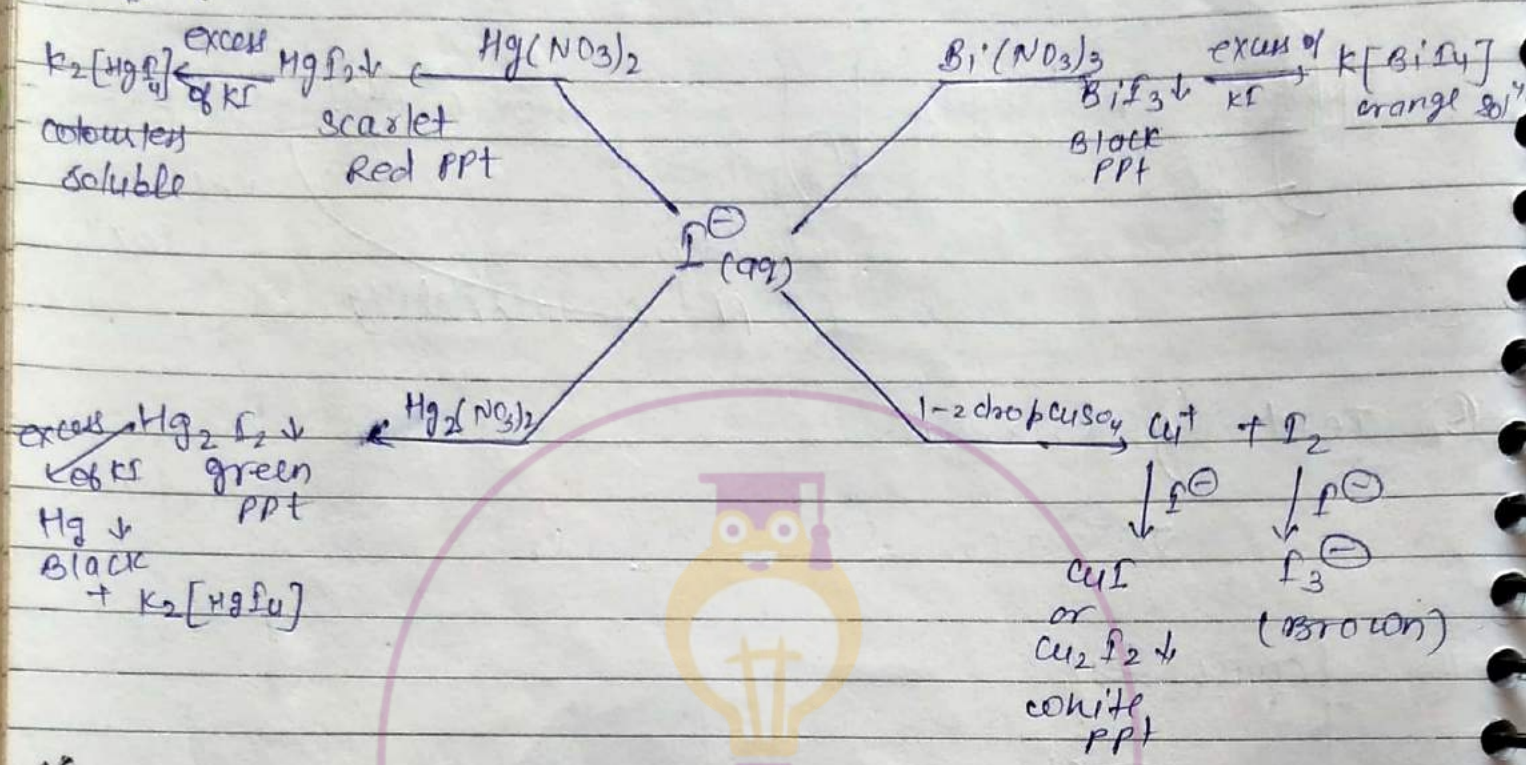
⑤ Test by $K_2Cr_2O_7$:-



⑥ layer test :-



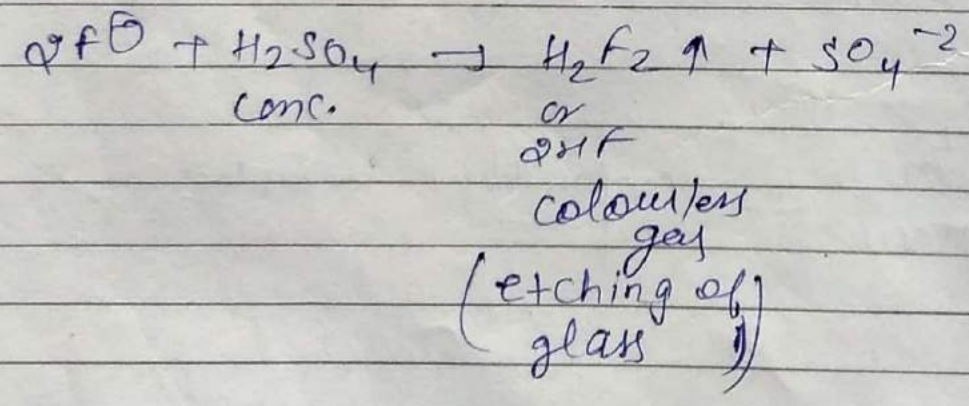
~~***~~
~~Note~~
~~***~~

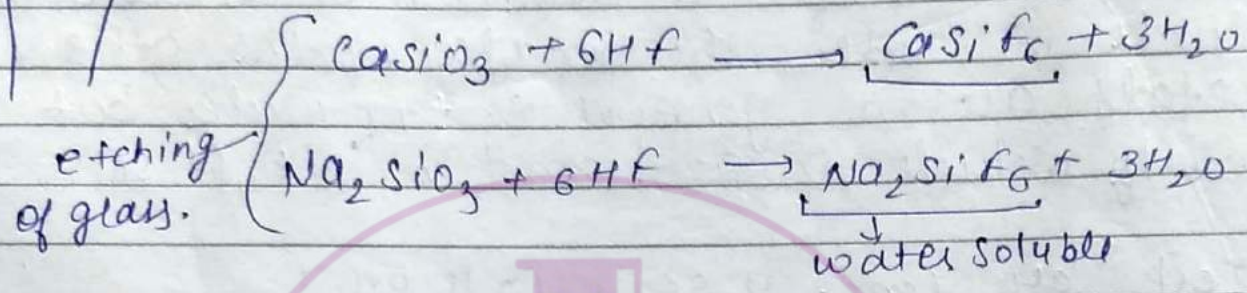
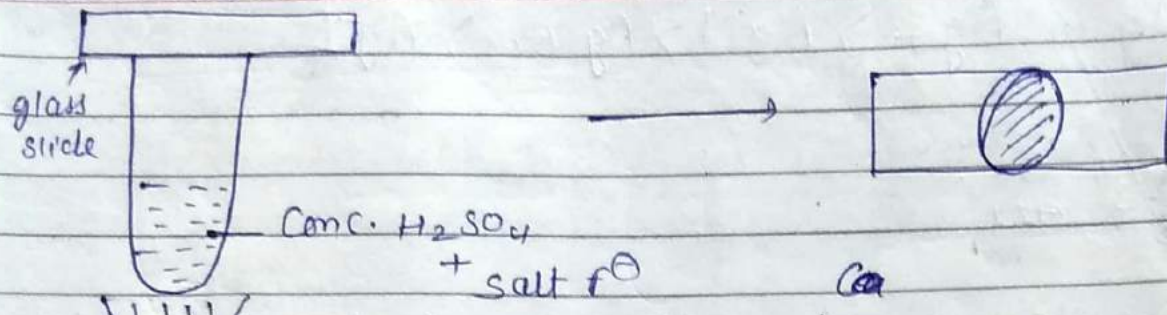


5) Test of F^-

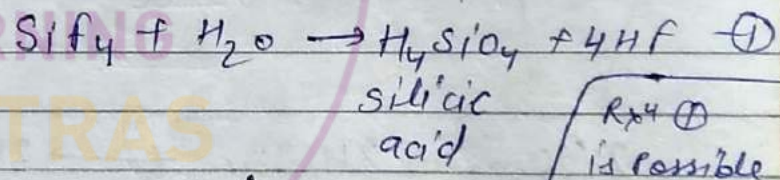
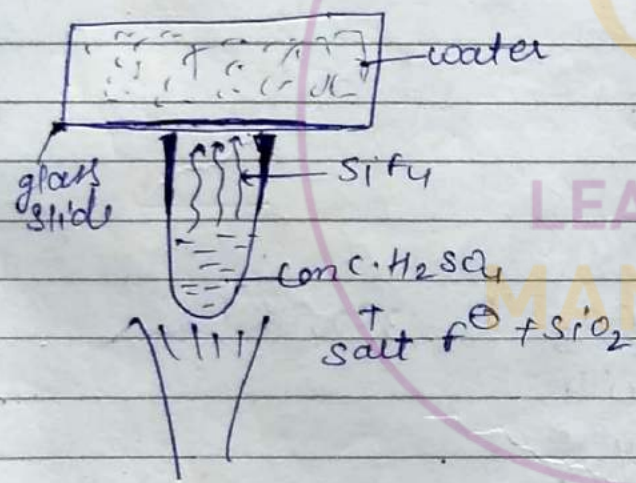
All F^- are water insoluble in water except
 LiF , AgF , HgF_2 , AlF_3 , Bef_2 and Nif_2 , Pb^{+2} , Cu^{+2} ,
 $Fe(III)$, Ba^{2+} & Li^+ = S.S.

iii) Test by Conc. H_2SO_4



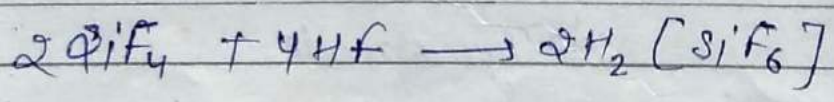


(ii) Test by Conc. H₂SO₄ + SiO₂ :

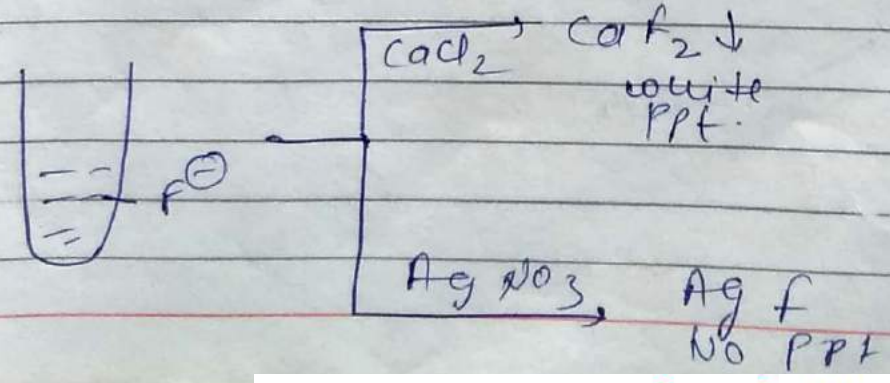


(Var like solid)
 $\xrightarrow{-2H_2O} SiO_2$

Rxn (i) is possible when water is on glass slide



(iii) Test by CaCl₂ / AgNO₃ :

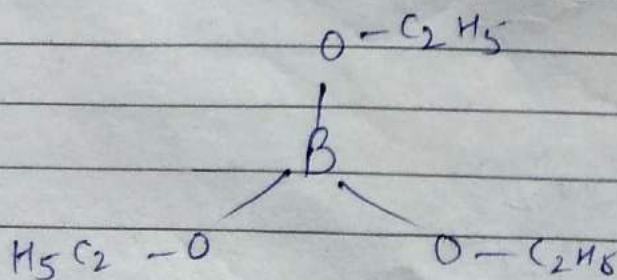
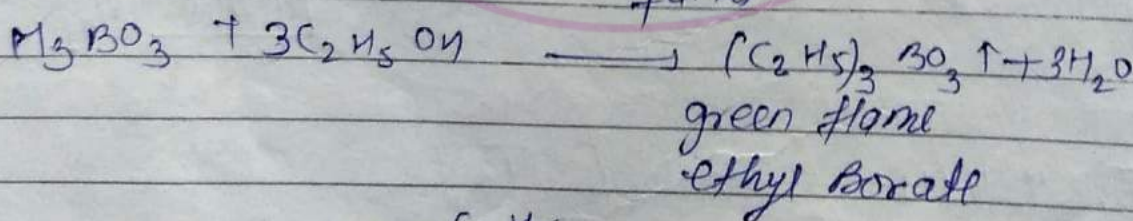
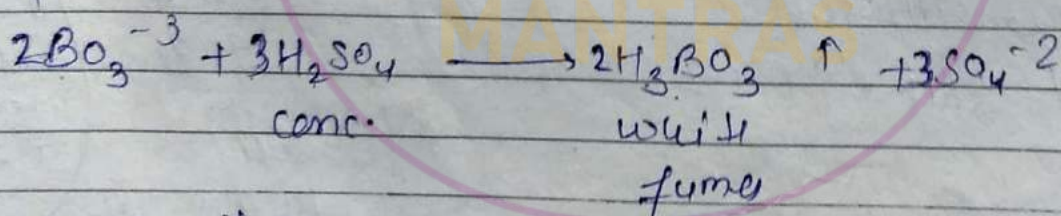
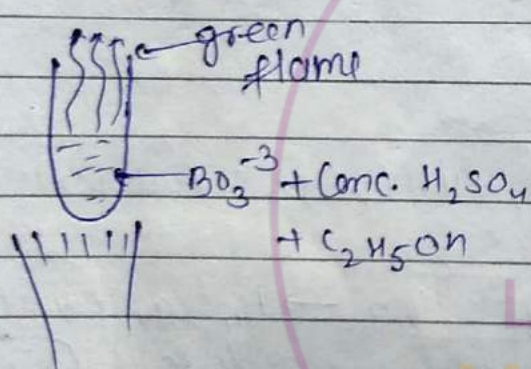


Solubility $\Rightarrow AgF > AgCl > AgBr > AgI$

6) Test of BO_3^{-3} :
All BO_3^{-3} are

The borates of the alkali metals are readily soluble in water, the borates of the other metals are in general $\phi.s$ in water but fairly soluble in acid and in NH_4Cl solⁿ.

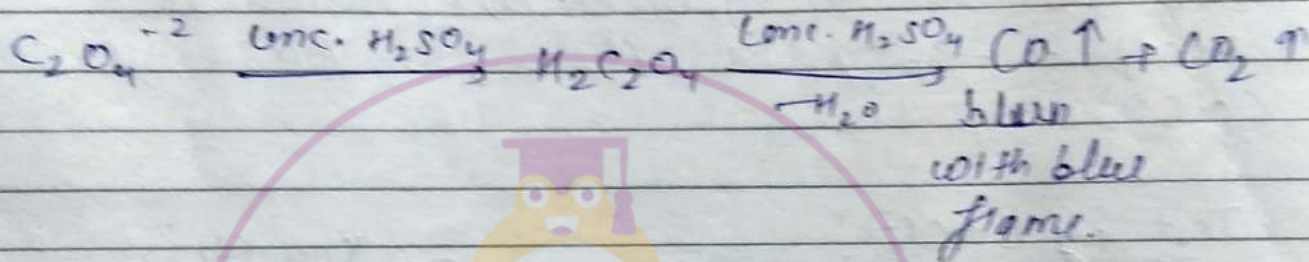
① Test by conc. $H_2SO_4 + C_2H_5OH$



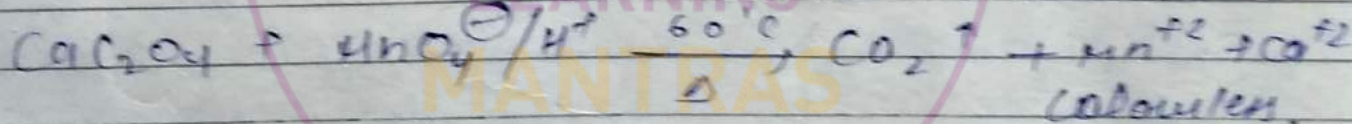
(vii) Test of Oxalate ion $[C_2O_4^{2-}]$:-

All oxalate $(C_2O_4^{2-})$ are water insoluble
Except - 1A, ferrous oxalate, Ammonium oxalate,
 $B \neq C_2O_4$

(i) Test by Conc. H_2SO_4 :-



(iii) Test by $CaCl_2$:-



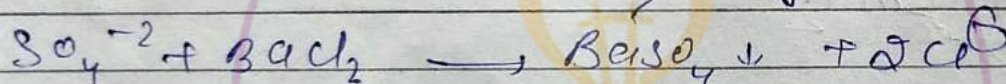
Class - 2nd

Sub group - 1

i) test of SO_4^{-2}

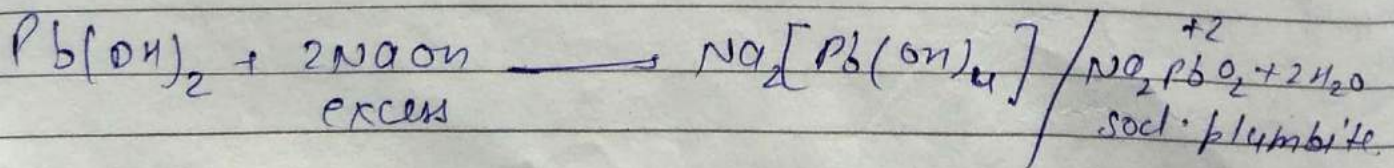
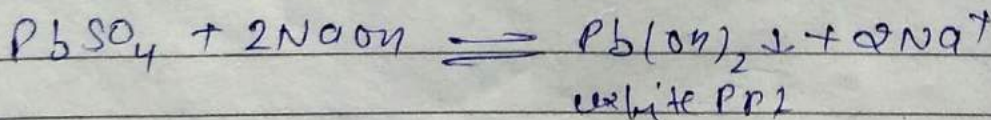
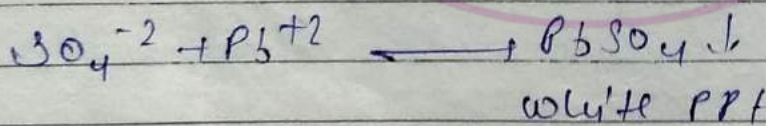
All SO_4^{-2} are water insoluble (some basic sulphates such as those of Hg, Bi, Cr are insoluble except - Ag_2SO_4 (s.s), $PbSO_4$ (s.s), $BaSO_4$, $SrSO_4$, $CaSO_4$ (s.s), Li_2SO_4)

ii) Test by $BaCl_2$



very low K_{sp}
white ppt
dil. HCl or conc. HCl
dil. HNO₃ or conc. HNO₃

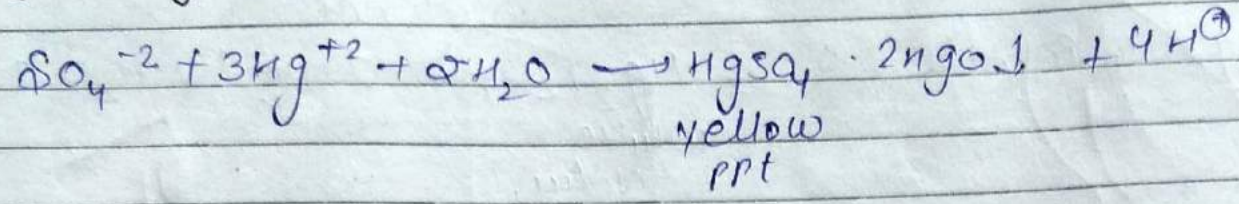
② test by $Pb(NO_3)_2$



→ 705/10

Exp 51
10-11, 18-25
Exp-2 1-10, 21, 22, -36
Page 42 (51-117)

③ Test by $HgCl_2(aq)$!

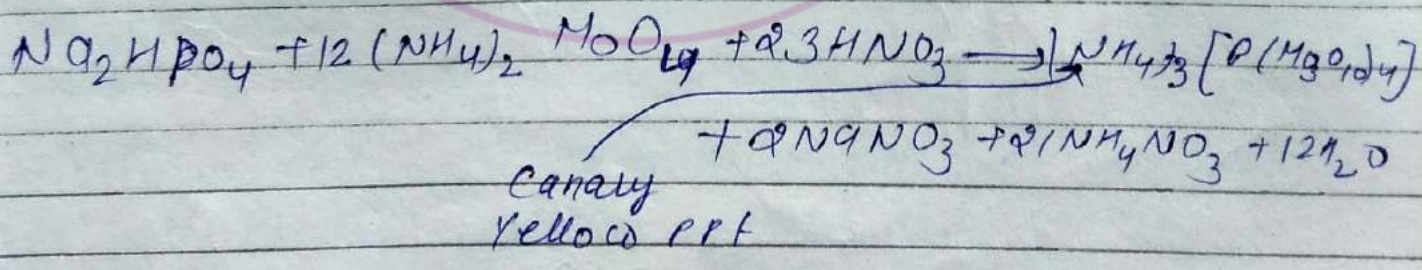


⊗ Test of Phosphate ion $[PO_4^{-3}]$:

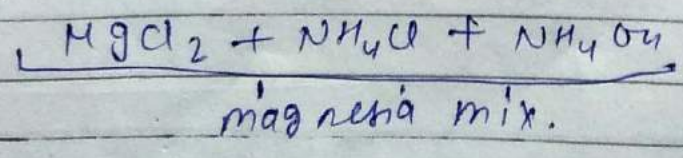
All phosphate (PO_4^{-3}) are water insoluble except $(NH_4)_3PO_4$, 1A Phosphates (except Li_3PO_4)
IA = 1° 2° 3° soluble 1A = 1° soluble but 2° 3° insoluble

(i) Test by ammonium molybdate! ($(NH_4)_2MoO_4$):

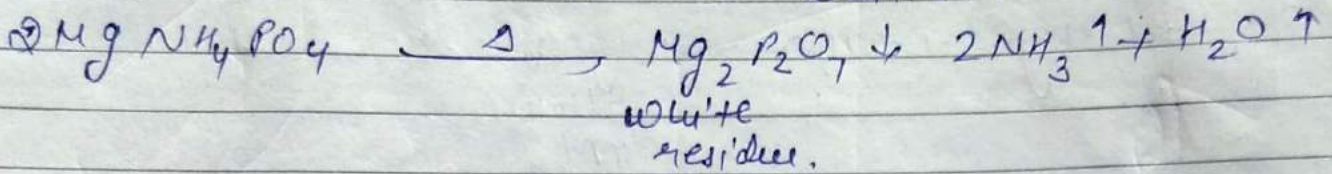
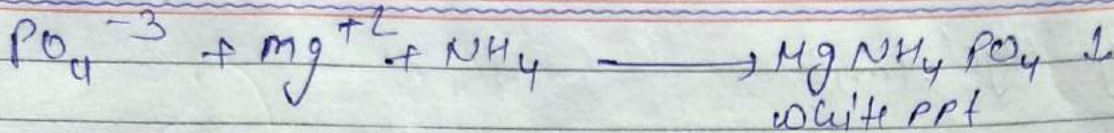
Add conc. HNO_3 and ammonium molybdate soln to the test soln containing phosphate ions and boil. A yellow colouration in soln or a ~~canary~~ yellow ppt of ammonium phosphomolybdate, $(NH_4)_3[P(Mo_3O_{10})_4]$ is formed. Each oxygen of phosphate has been replaced by Mo_3O_{10} gp.



(ii) Test by magnesia mixture?



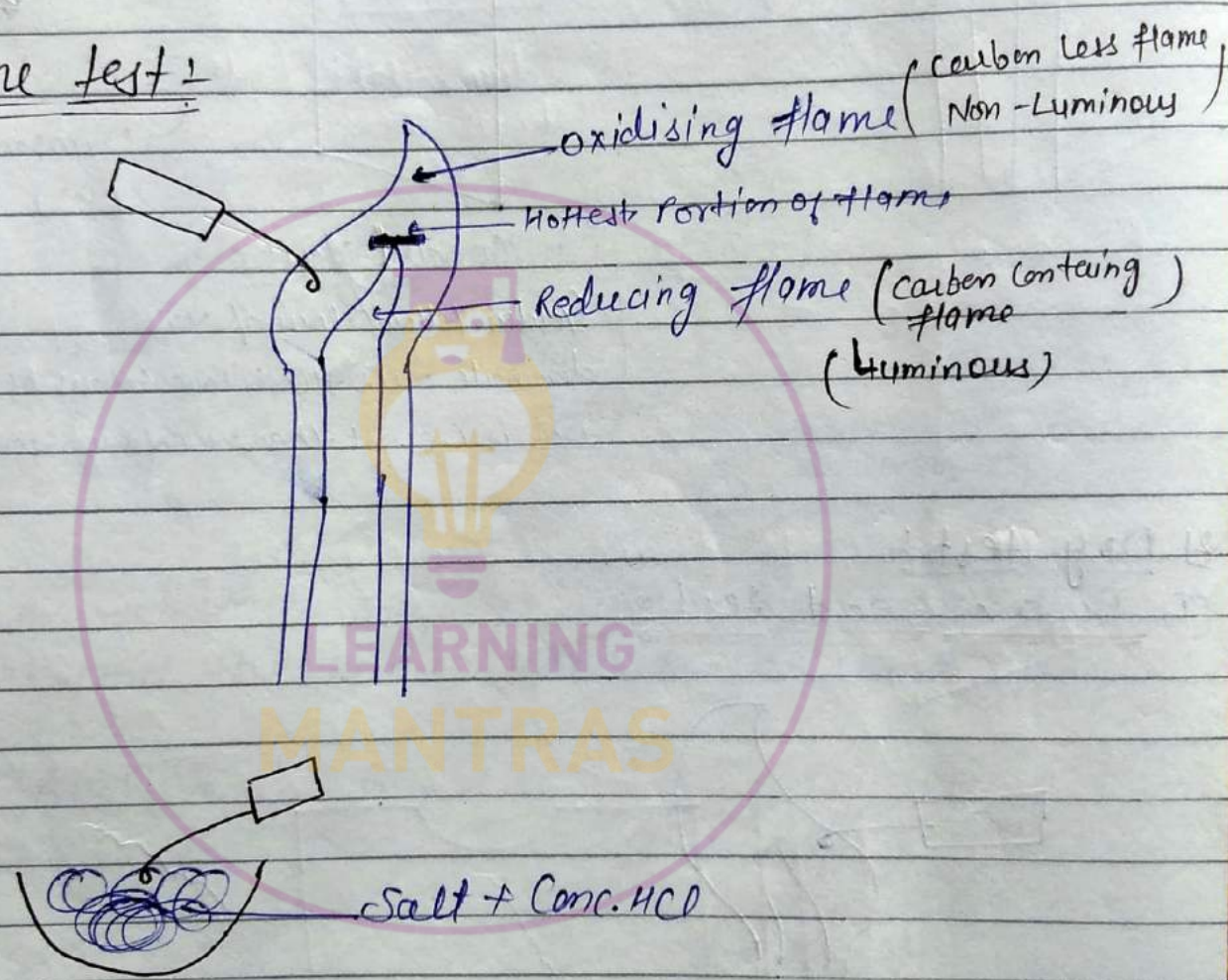
Reactions



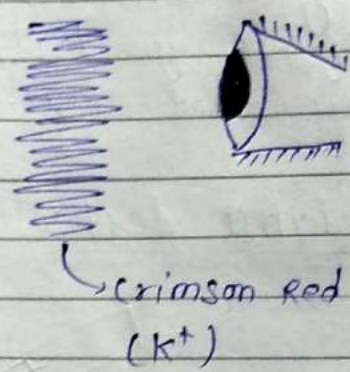
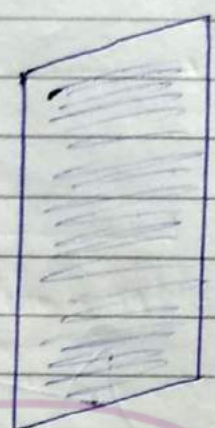
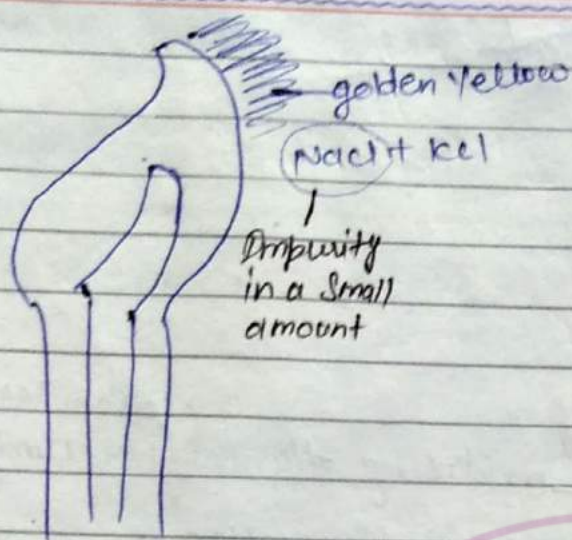
Test of Cation's

- ① by flame test - cat
- ② by dry test
- ③ by wet test

① Flame test :-



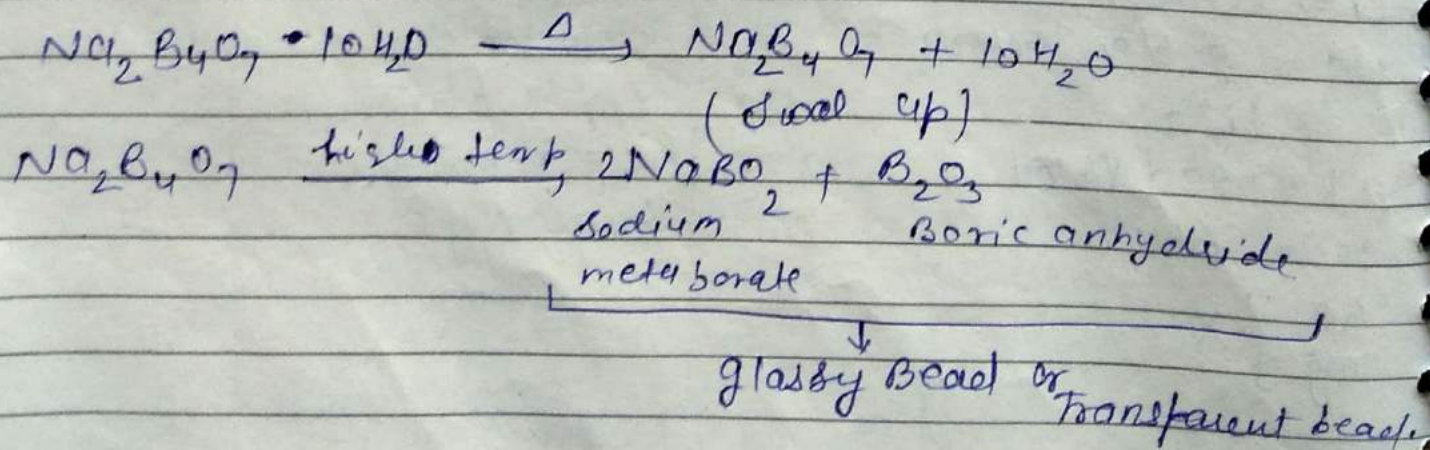
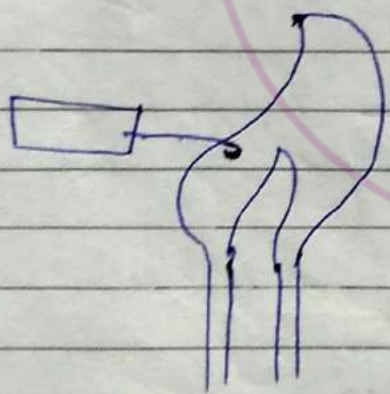
- | | |
|--------------------|---------------------|
| Li ⇒ Crimson Red | Ca ⇒ Brick Red |
| Na ⇒ golden yellow | Sr ⇒ crimson Red |
| K ⇒ Lilac | Ba ⇒ Apple green |
| Rb ⇒ Red Violet | BO_3^{-3} ⇒ green |
| Cs ⇒ Blue | Cu ⇒ blue/green |
| Be } X | |
| Mg } X | |



Golden yellow colour of Na⁺ dominate over the violet colour of K⁺ if only Na⁺ is present then no colour observed in cobalt glass

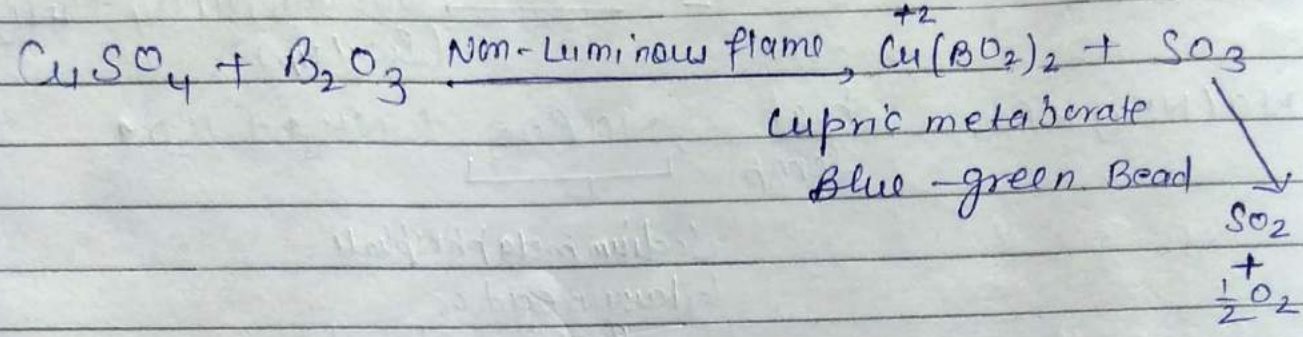
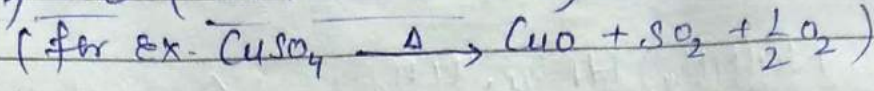
2) Dry test:-

① Borax Bead test:-

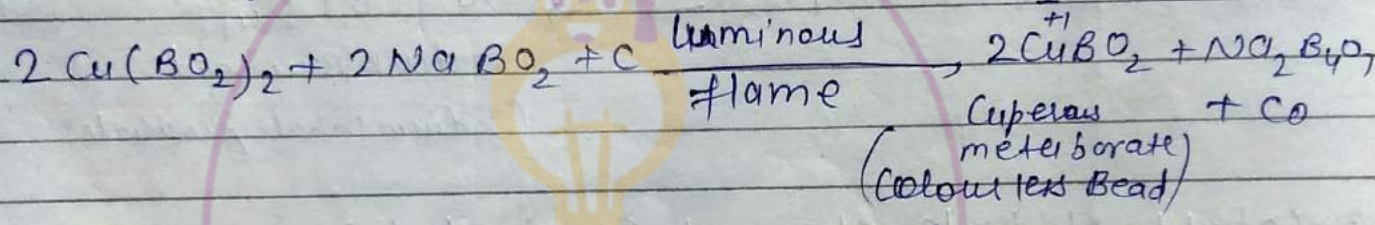


So₂⁻²

i) In oxidising flame (Non-luminous):

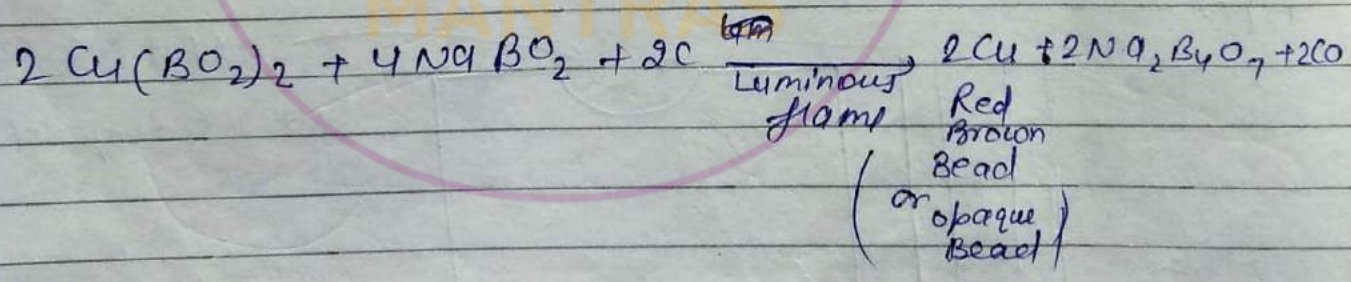


ii) In Reducing flame (Luminous flame):



or

Cupric metaborate may be reduced to metallic copper and the bead appears red and opaque.



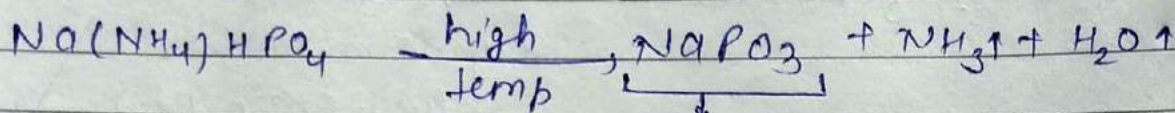
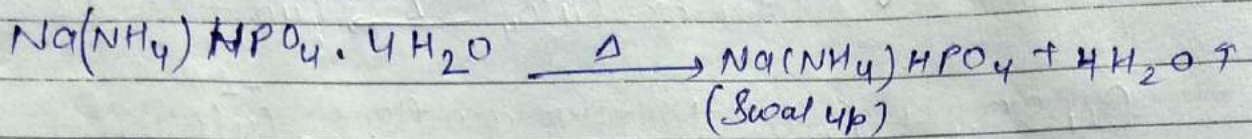
★★★★★

Note!

In oxidising flame (in cold)

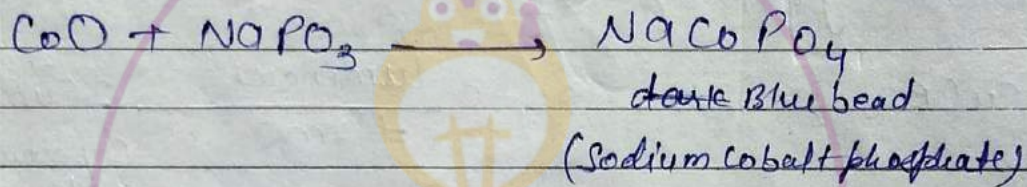
| | |
|-------------------------------------|---------------------------------|
| $Co(BO_2)_2 \Rightarrow$ dark Blue | $Cr(BO_2)_3 \Rightarrow$ green |
| $Cu(BO_2)_2 \Rightarrow$ light blue | $Mn(BO_2)_2 \Rightarrow$ Violet |
| $Fe(BO_2)_3 \Rightarrow$ yellow | $Ni(BO_2)_2 \Rightarrow$ Brown. |

(2) Microcosmic Salt Bead test:

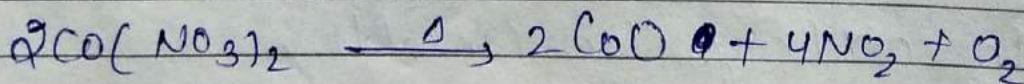
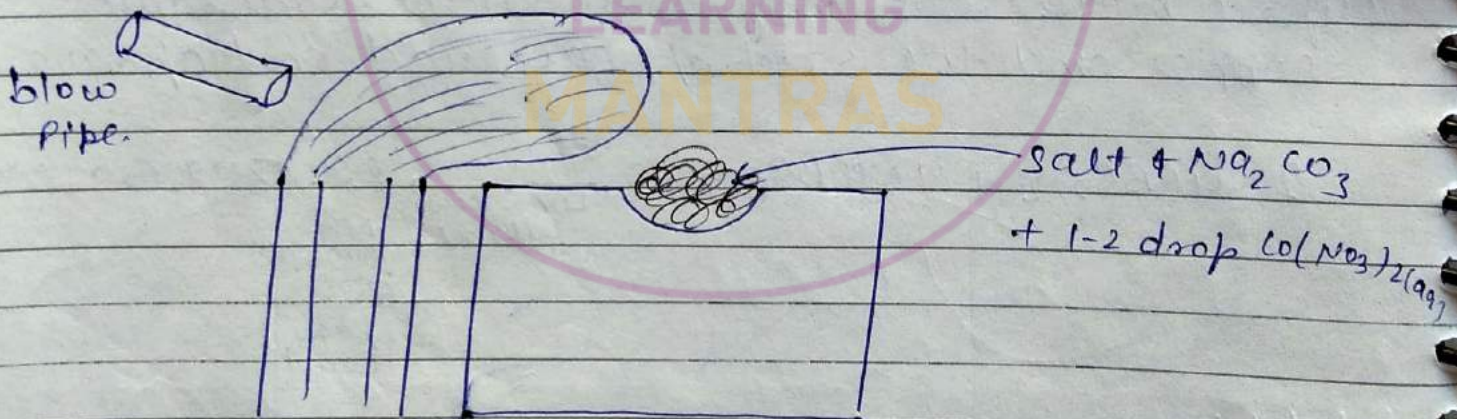


Sodium meta phosphate
Glassy bead or
(Transparent bead)

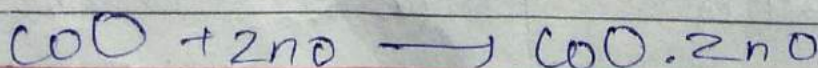
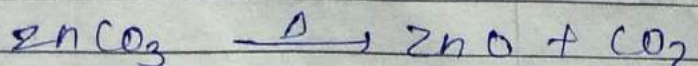
for ex:



(3) Cobalt Nitrate charcoal cavity test:



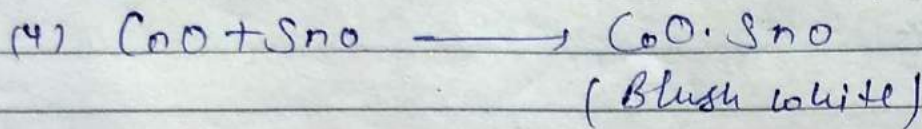
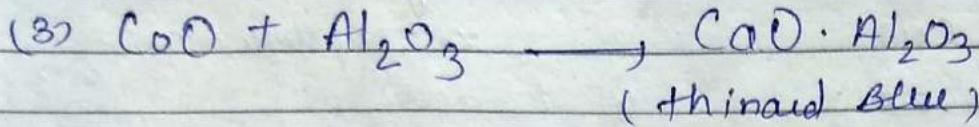
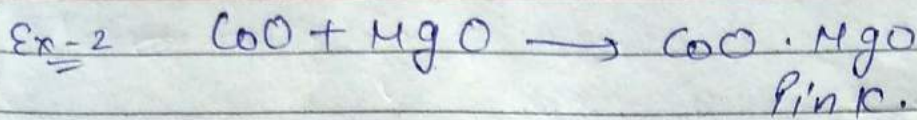
for ex:



Remains green,

acid - dichromate
base - chromate

Page - 36, 37.
Ex - 2 - 21-36.

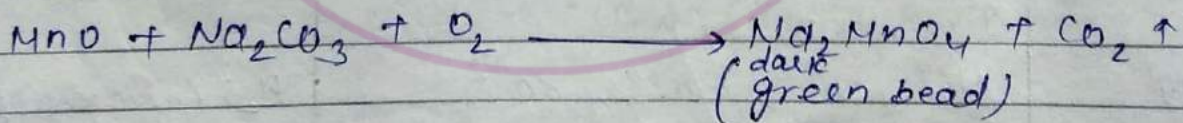


(v) fusion mixture or ^{test} Na_2CO_3 bead test :-

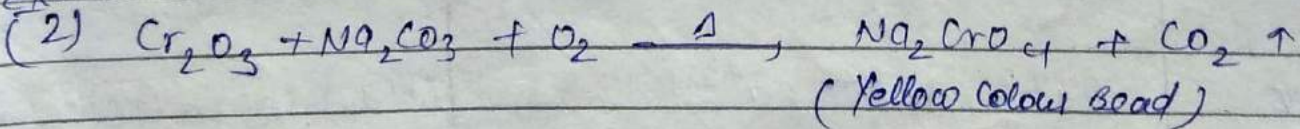
Salt + Na_2CO_3 + NaNO_3 / KNO_3 / KClO_3
mixture.

(only valid for ~~Fe~~ ~~Cr~~ Mn & Cr)

for ex:



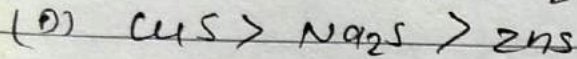
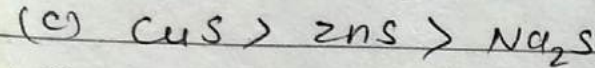
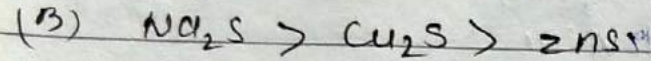
Ex-



(3)

(3) Wet test:

Q. ~~Wet~~ Select the correct order of solubility



Zn^{2+} very stable as compared to Cu^{2+}

* Classification of Cation:

| group | Cations | Group reagent |
|------------|---|---|
| group-I | Ag^+, Hg^{+2}, Pb^{+2} आग, हीगा, प्रोब्लम | dil. HCl |
| group-II A | $Pb^{+2}, Cd^{+2}, Bi^{+3}, Hg^{+2}, Cu^{+2}$ पजाबी, कुडी, आ, हीगा, कुनी | H_2S gas in presence of dil. HCl |
| II B | $As^{+3}, As^{+5}, Sb^{+3}, Sb^{+5}, Sn^{+2}, Sn^{+4}$ असी, सब, सुनी | |
| group-III | $Al^{+3}, Cr^{+3}, Fe^{+3}$ ऑल, करोडपल, लकीर | NH_4OH in presence of NH_4Cl |
| group-IV | $Ni^{+2}, Co^{+2}, Mn^{+2}, Zn^{+2}$ नि, को, मल, लल | H_2S in presence of $NH_4OH + NH_4Cl$ |
| group-V | $Ba^{+2}, Sr^{+2}, Ca^{+2}$ बाजेश, सरकी, काइ | $(NH_4)_2CO_3$ in presence of $NH_4Cl + NH_4OH$ |
| group-VI | Na^+, Mg^{+2}, K^+ ना, मागा, काज | None |
| Zero group | NH_4^+ | None |

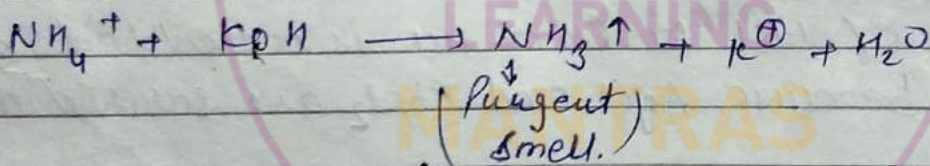
★ ★ ★
 Note: oxide and hydroxide ~~are~~ peroxide are soluble
 ★ ★ in excess of NaOH when they are amphoteric in nature

(2) Oxide and hydroxide ppt are soluble in excess of ammonia when metal ion belongs to d-block
 Except - Fe^{+2} , Fe^{+3} , Hg_2^{+2} , Hg^{+2} , and Mn^{+2}

* Zero group: (NH_4^+)

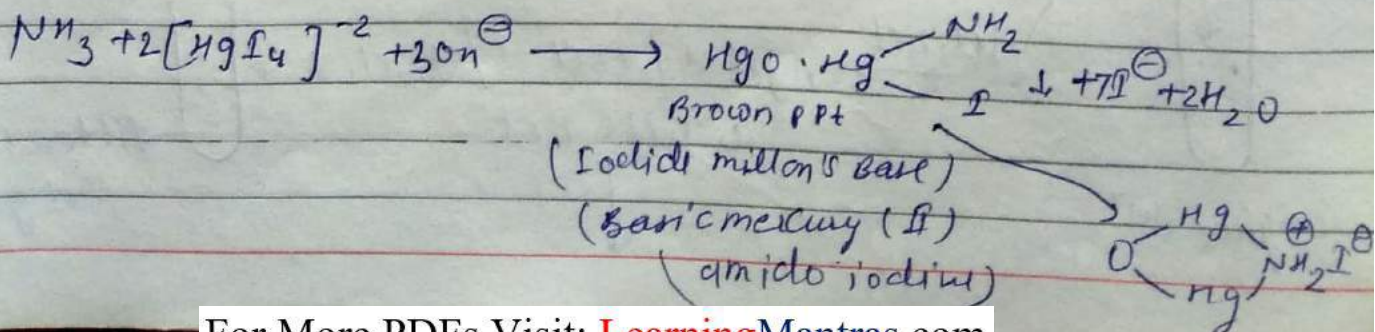
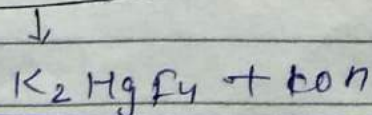
- (1) No common group reagent.
- 2) No common ppt
- 3) Generally identified by messler's reagent

① Test by NaOH / KOH:



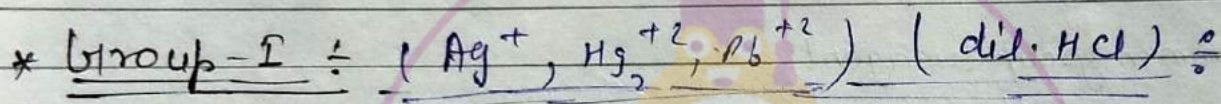
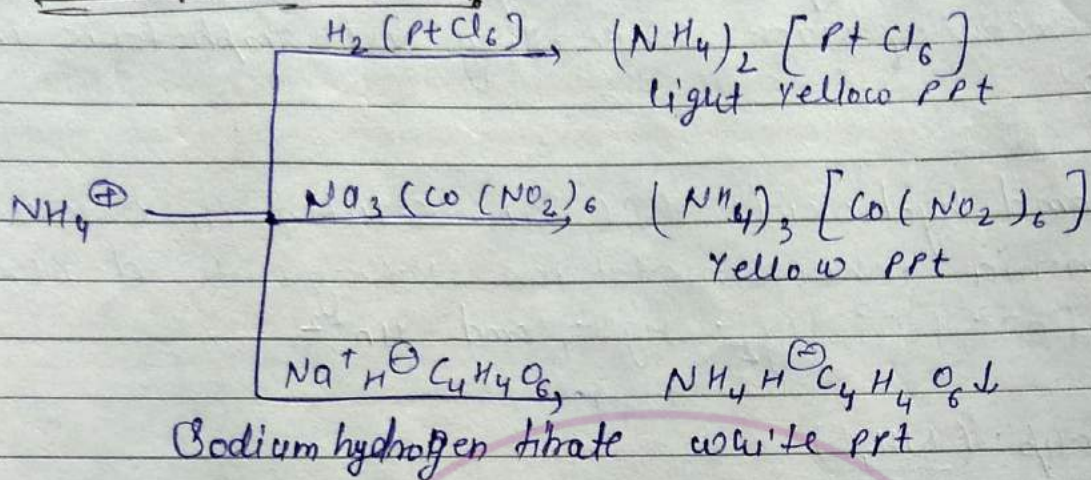
- (i) white fumes with dil. HCl
 $(NH_3 + HCl \xrightarrow{dil.} NH_4Cl)$
 (white fumes)
- (ii) Red litmus to blue.
- (iii) Litmus paper of $Hg_2^{+2} / Hg_2(NO_3)_2$

(2) Nessler's reagent:



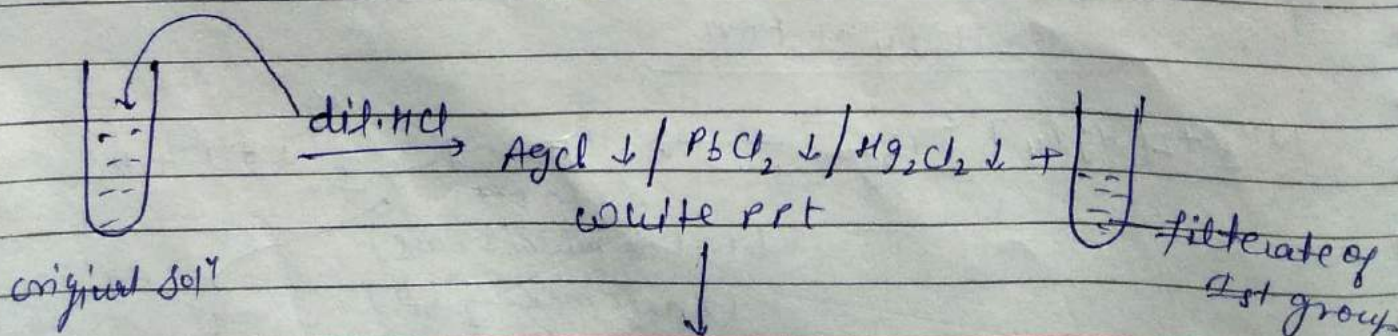
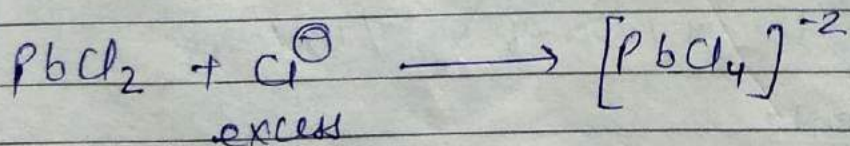
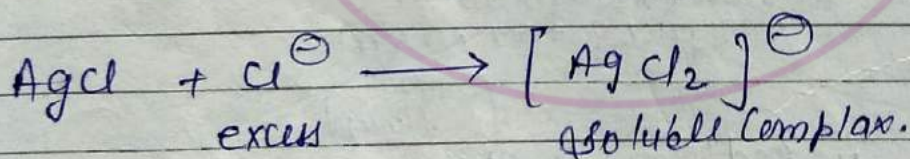
(3)

Precipitation test



1) On addition of dil. HCl in original solⁿ only group-I cations are precipitated because other group cations are not precipitated with dil. HCl

2) Excess amount of HCl or concⁿ. HCl is not added in original solⁿ. because $AgCl$ and $PbCl_2$ are soluble in excess of Cl^-

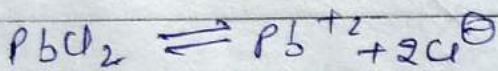


जिस तरह से Cu^{+1} पानी में disproportionate होता है उसी तरह से Hg_2^{+2} भी NH_3 में disproportionate होता है

$AgCl \downarrow / PbCl_2 \downarrow / H_2Cl_2 \downarrow$
white ppt

Hot water

If Soluble
 $PbCl_2$



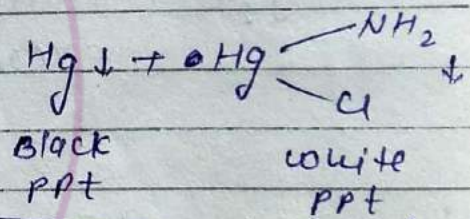
Not Soluble

$AgCl \downarrow / Hg_2Cl_2$

excess of NH_3 or NH_4OH excess

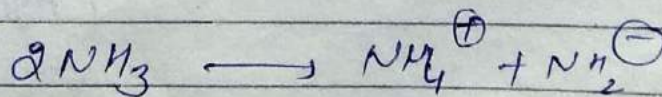
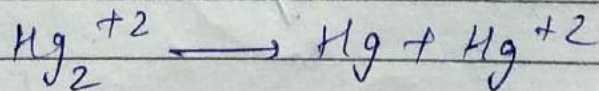
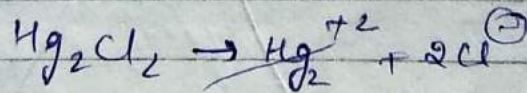
if $AgCl$
 $[Ag(NH_3)_2]^+$
Soluble

if Hg_2Cl_2

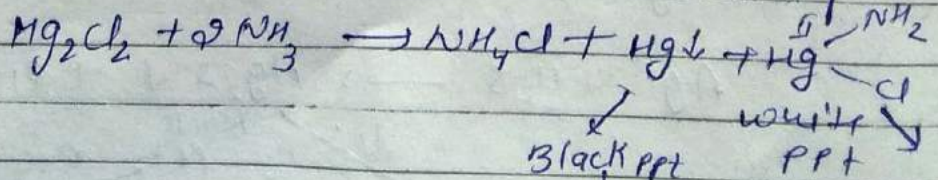


shining black ppt / Calomel ppt

(Hg_2^{+2} is disproportionate in NH_3)

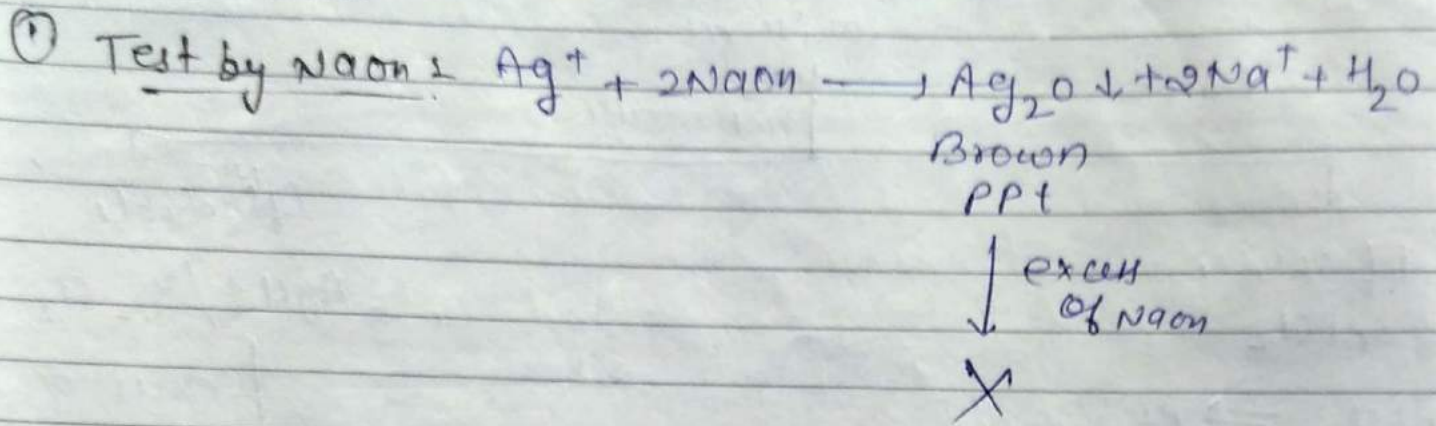


mercuric amidochloride

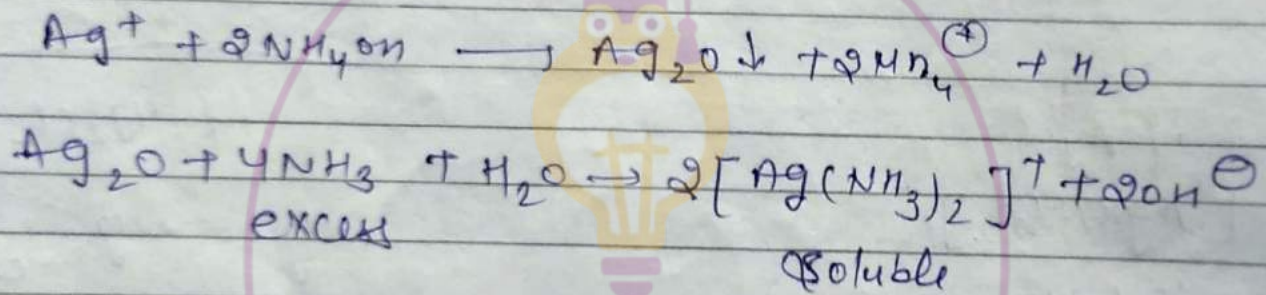


shining black ppt / Calomel ppt

* Test of Ag⁺:

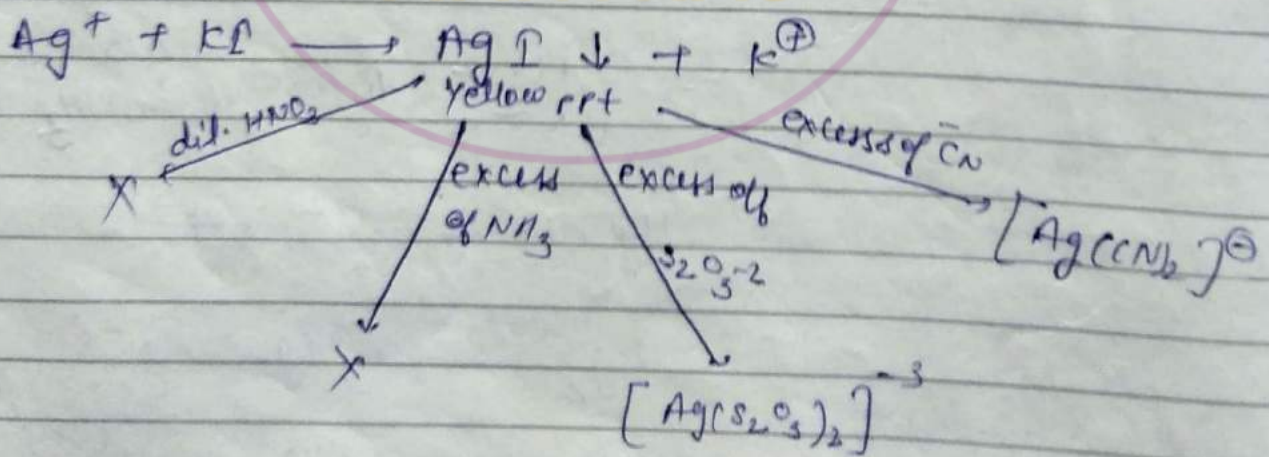


(2) test by NH₄OH:

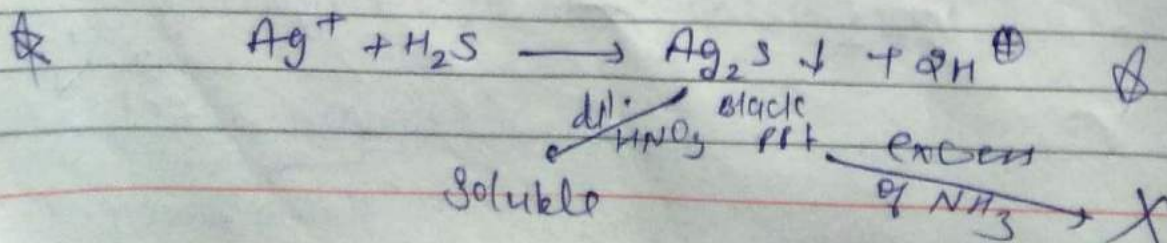


LEARNING
MANTRAS

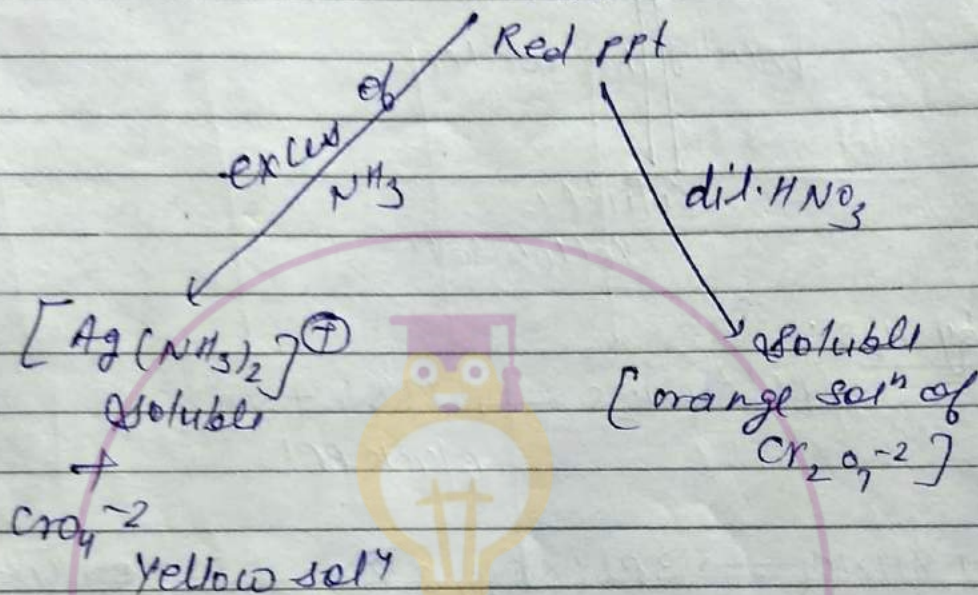
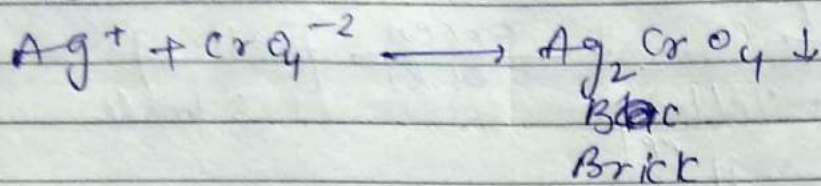
(3) test by KI:



(4) Test by H₂S:

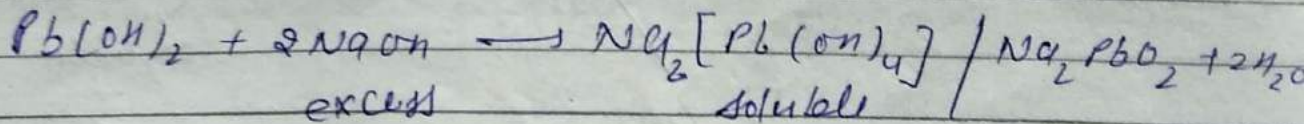
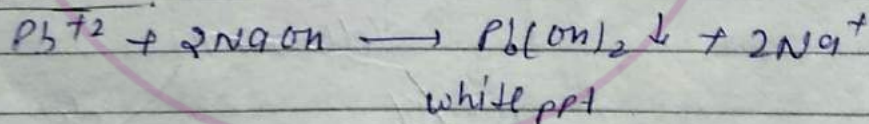


(5) Test by K_2CrO_4

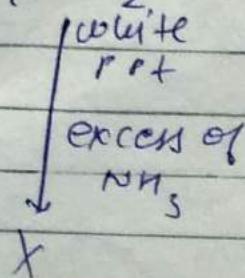
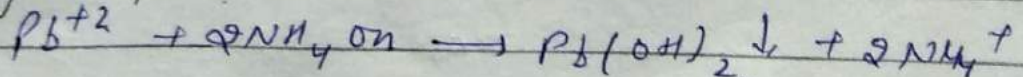


(ii) Test of Pb^{2+}

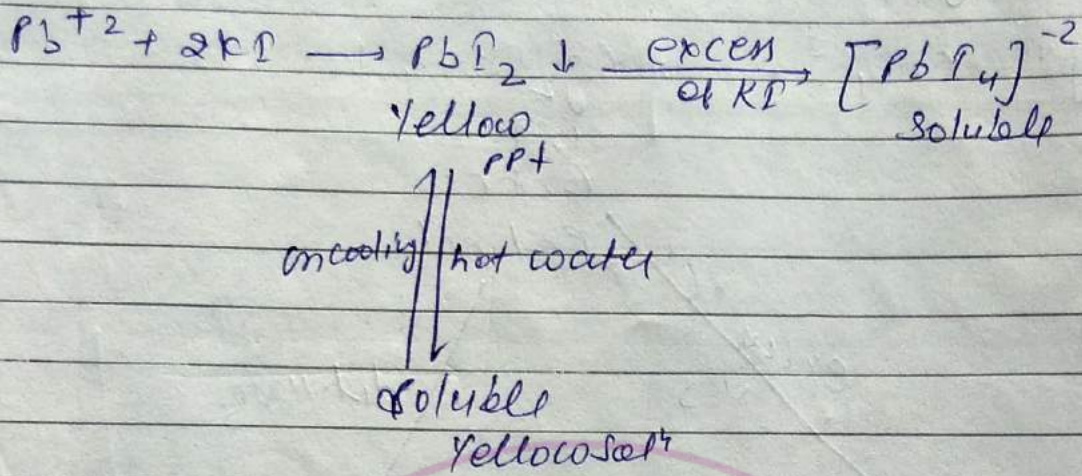
Test by $NaOH$



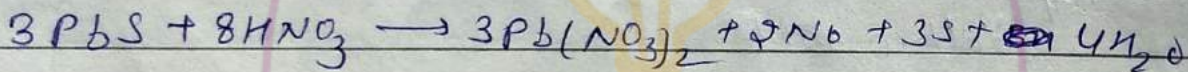
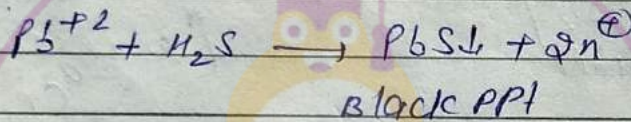
(2) Test by NH_4OH



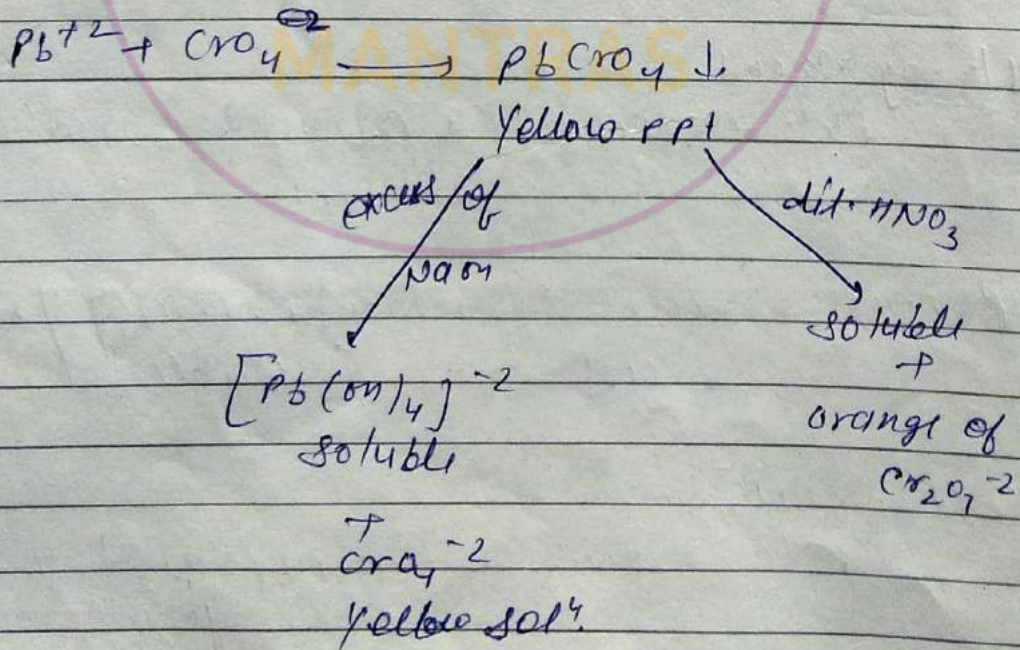
3) Test by KI \rightarrow



4) Test by H_2S :

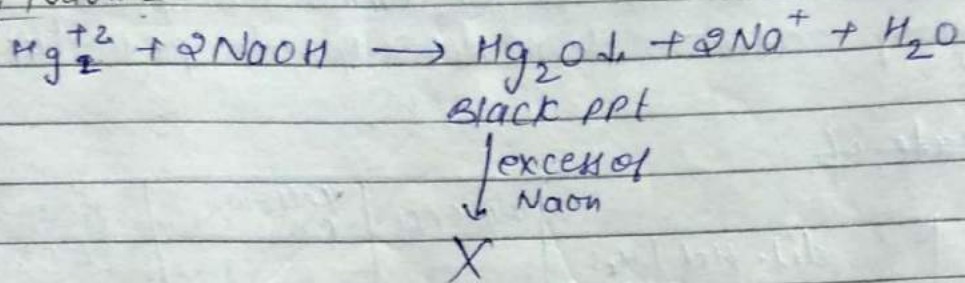


5) Test by K_2CrO_4

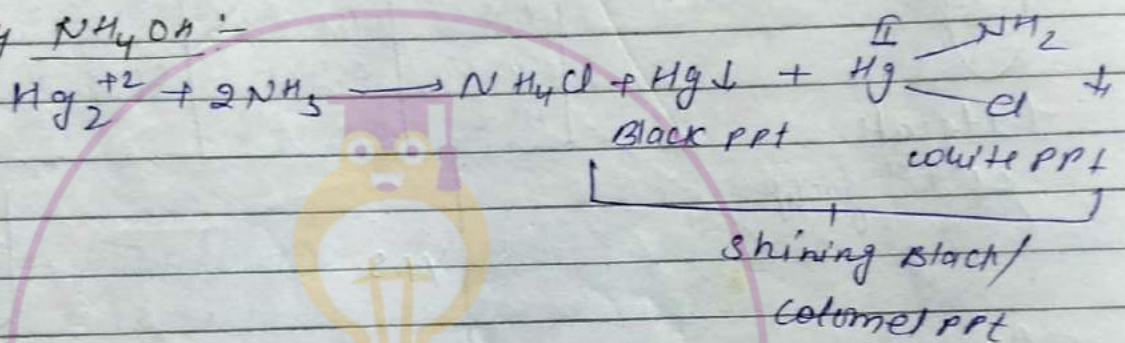


* Test of Hg_2^{+2} :-

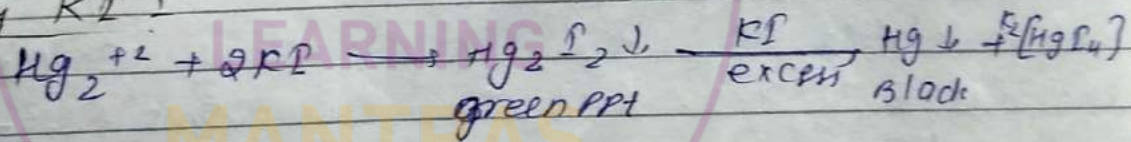
(1) test by NaOH :-



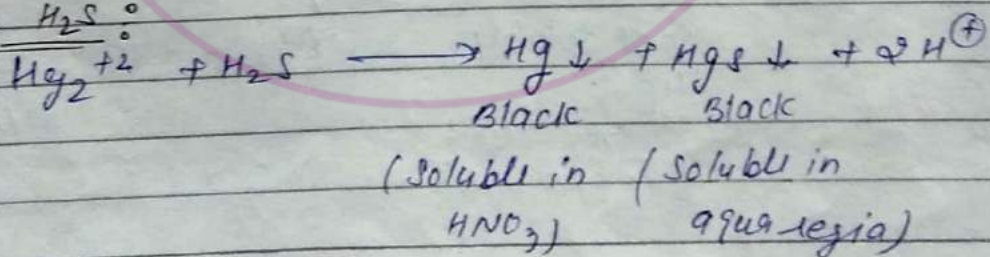
(2) test by NH_4OH :-



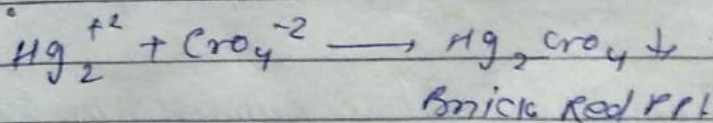
(3) test by KI :-



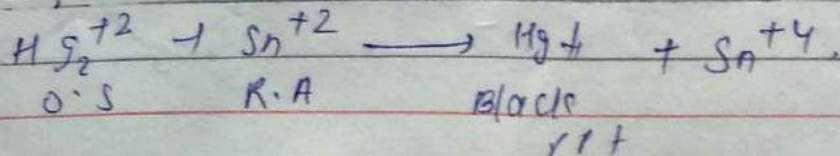
(4) test by H_2S :-



(5) test by K_2CrO_4 :-



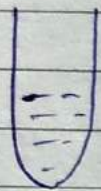
(6) test by $SnCl_2$:-



* Group - II (~~has~~ H_2S in presence in dil. HCl)

In II group in the presence of dil. HCl dissociation of H_2S is decreased (due to common ion effect) so that only IInd group cations formed sulphide ppt due to Low K_{sp}

Filtrate of

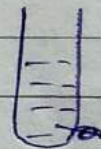


Filtrate of Ist group

dil. HCl / H_2S

| Black ppt | Yellow ppt | orange ppt | brown ppt |
|-------------------------|---|--|---|
| PbS ↓ CuS ↓ HgS ↓ | CdS ↓, SnS ₂ ↓ As ₂ S ₃ ↓ As ₂ S ₅ ↓ | Sb ₂ S ₃ ↓ Sb ₂ S ₅ ↓ | Bi ₂ S ₃ ↓ SnS ↓ |

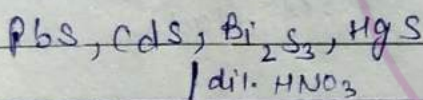
YAS



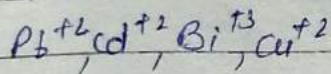
Filtrate of II-group

IIA

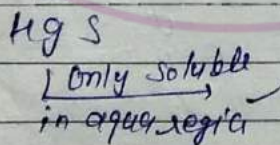
Not Soluble



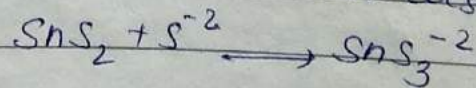
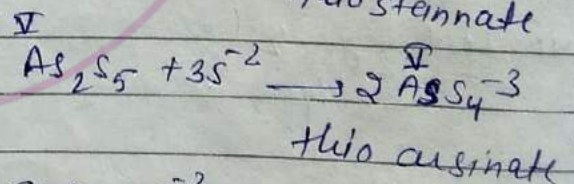
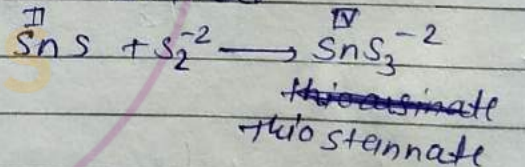
Soluble



not Soluble



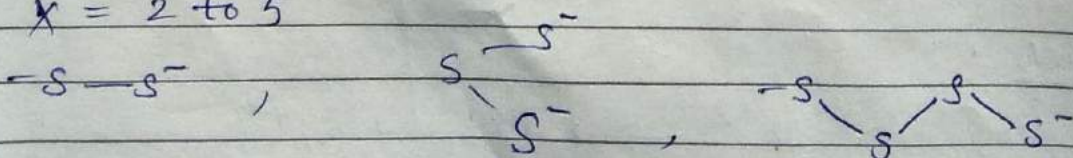
Soluble



⇒ $(NH_4)_2S$ ⇒ ammonium sulphide (white)

⇒ $(NH_4)_2S_x$ ⇒ Yellow ammonium sulphide (YAS)

x = 2 to 5



Into two subgroup

1] ~~II~~ Classification of Group II sulphides is based on solubility of sulphide ppt in YAS

2] II B subgroup sulphides are soluble in YAS due to formation of thio anions

3] II B subgroup sulphides are also soluble in ordinary ammonium sulphide (white). Except SnS.

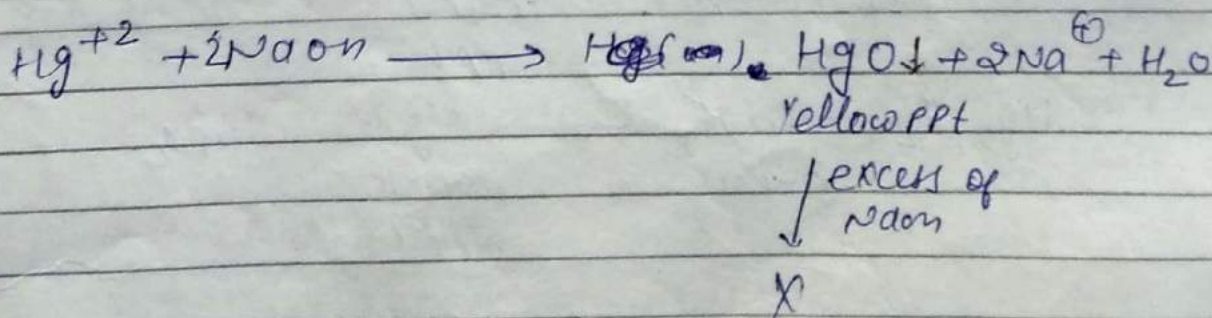
4] II A subgroup sulphides are soluble in dil. HNO_3 . Except HgS

5] IInd group sulphides does not produce H_2S with dil. HCl because their formation is possible in presence of dil. HCl

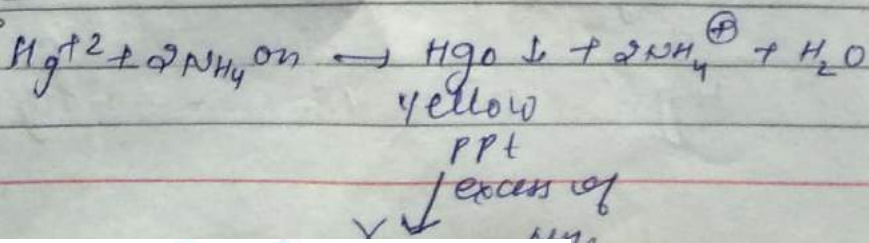
6] All Black colour sulphides (except FeS) does not produce H_2S with dil. HCl

(i) test of Hg^{+2}

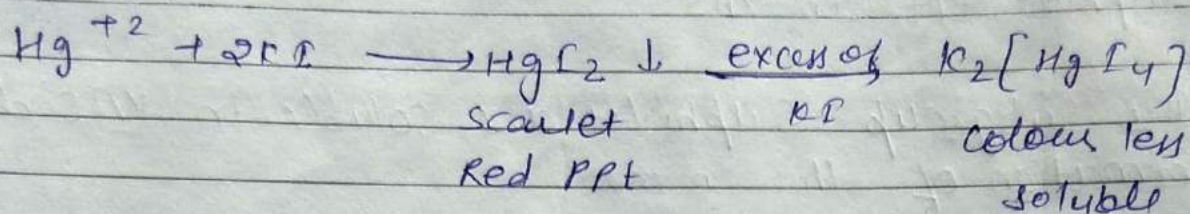
Test by NaOH:



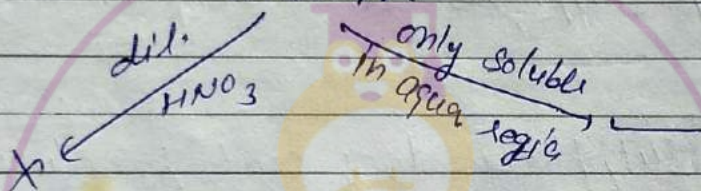
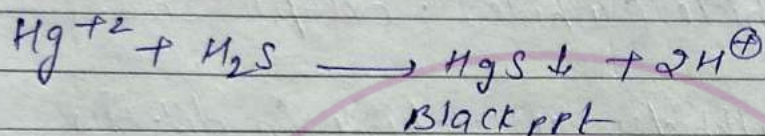
(2) Test by NH_4OH



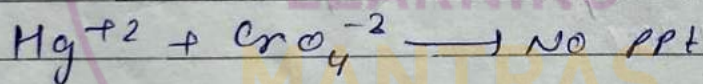
(3) test by KI :



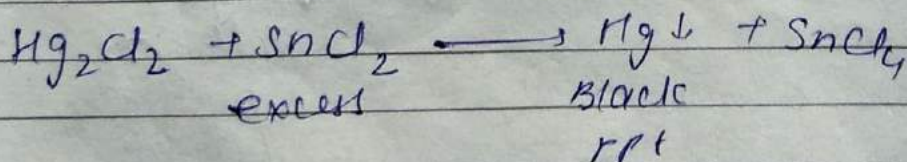
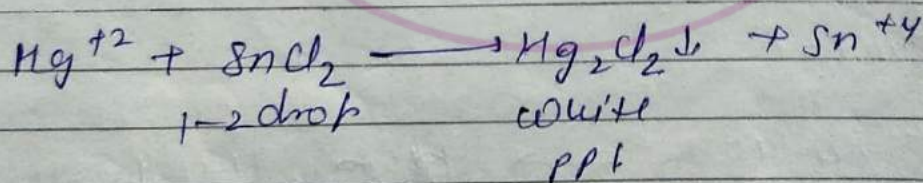
(4) test by H₂S



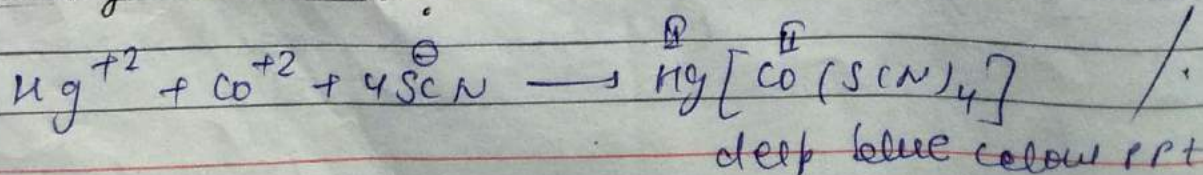
(5) test by K₂CrO₄ :



(6) test by SnCl₂ (aq)



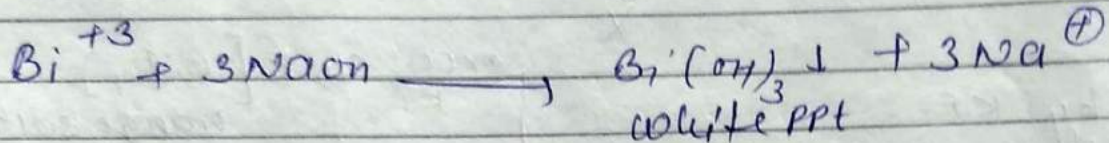
(7) test by Co(SCN)₂ :



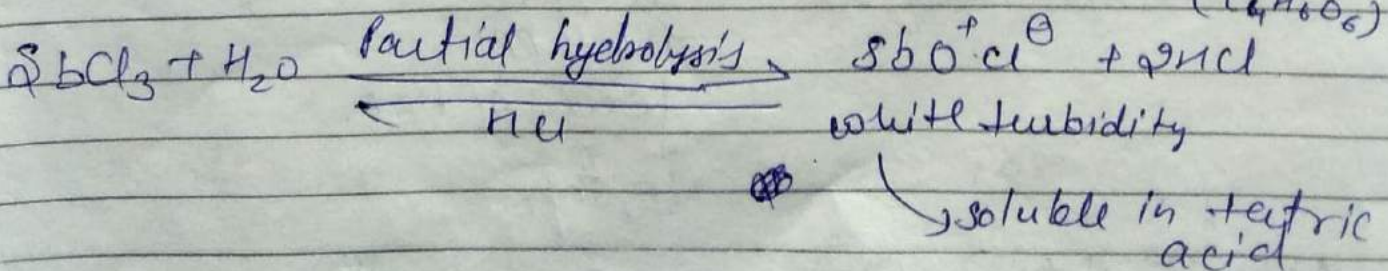
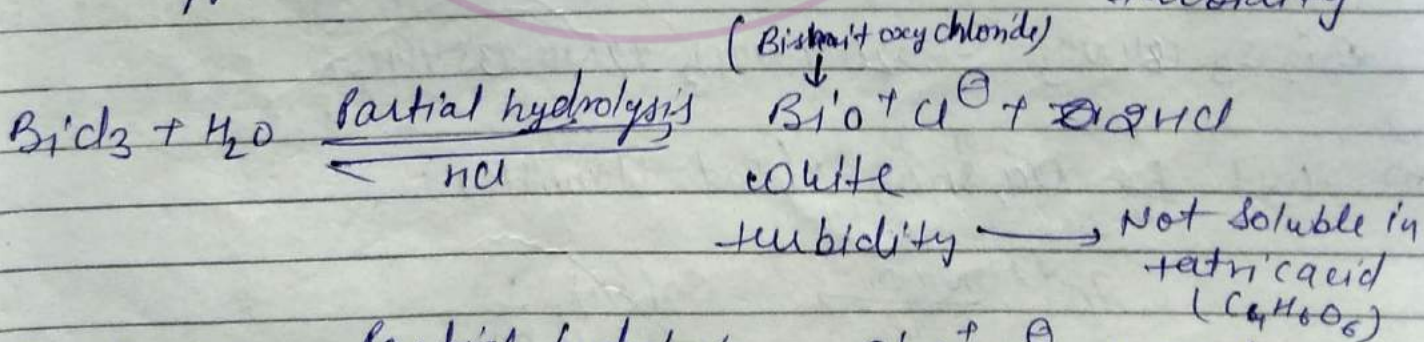
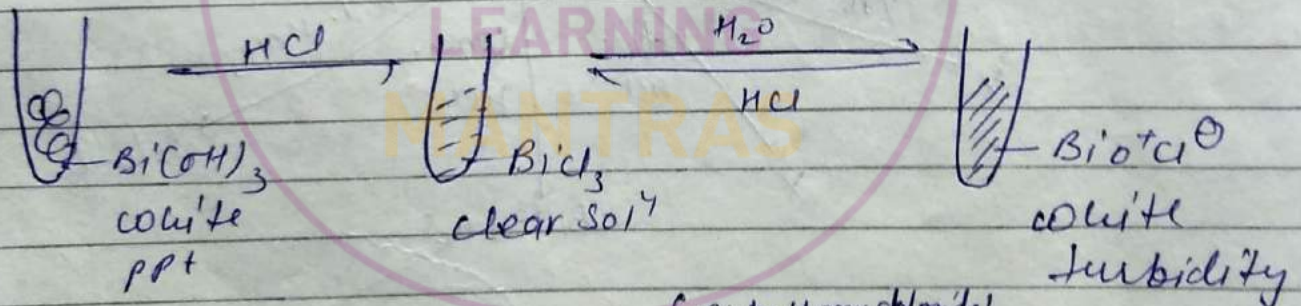
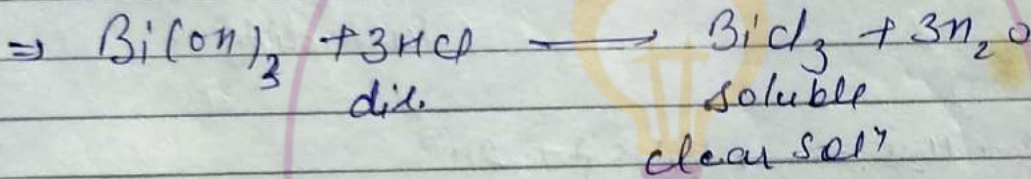
m/ $\text{Co}(\text{Hg}(\text{SCN})_4)$

⊛ Test of Bi^{+3}

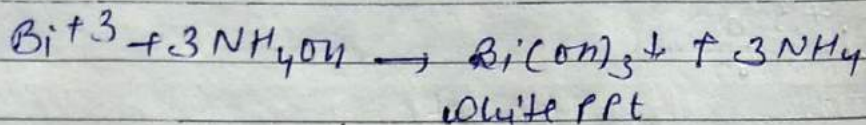
① Test by NaOH



↓ excess of NaOH
X

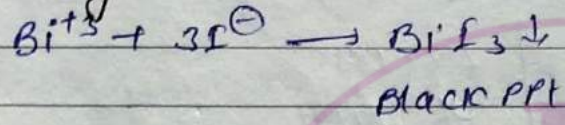


② test by NH_4OH :

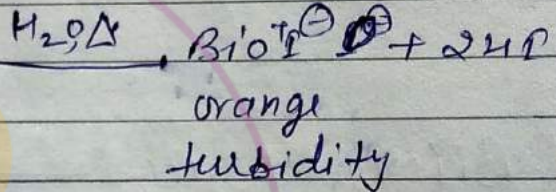


↓ excess of NH_3
X

(8) Test by $\text{KI} \Rightarrow$



excess of $\text{KI} \rightarrow [\text{BiI}_4]$
orange solⁿ



(9) test by H_2S :

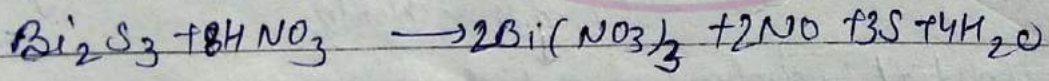


YAS
X

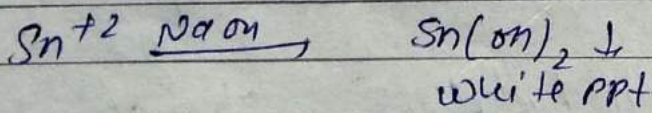
↓ dil. HCl
X

↓ concn. HCl
 $\text{Bi}^{+3} + \text{H}_2\text{S}$

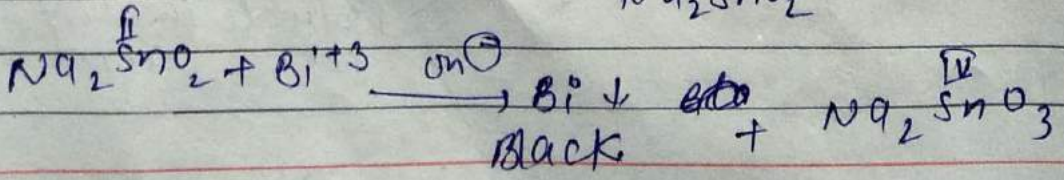
↓ dil. HNO_3
soluble



(10) test by Na_2SnO_2 ? (sod. stannite) ?

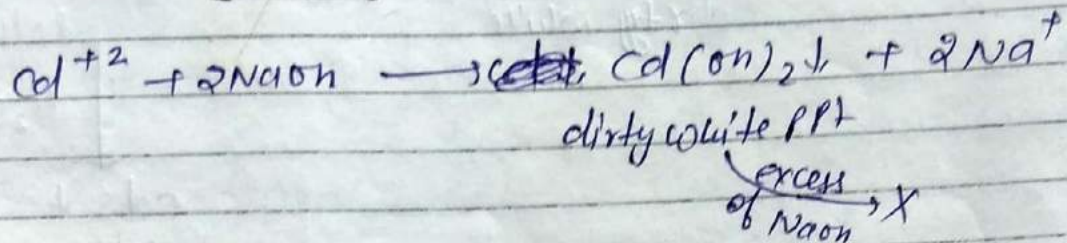


↓ excess of NaOH
 Na_2SnO_2

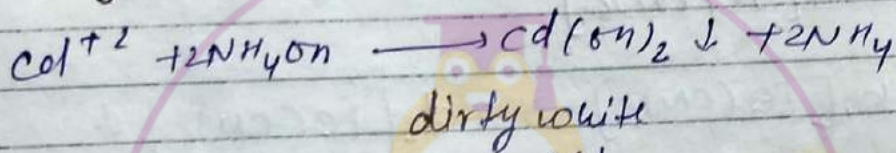


X Test of Cd^{+2} ?

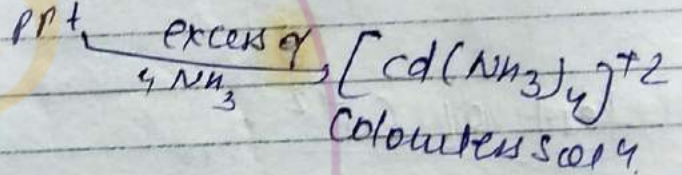
(1) Cd^{+2} test by NaOH:



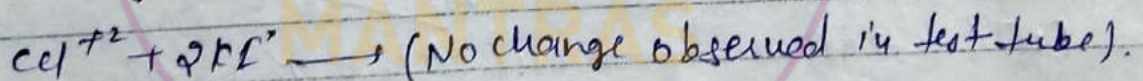
(2) test by NH_4OH :



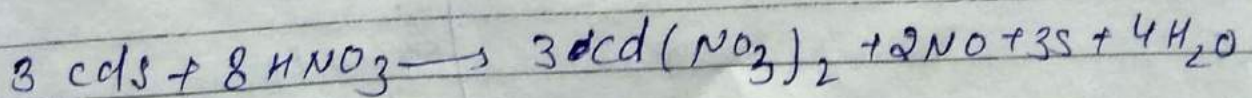
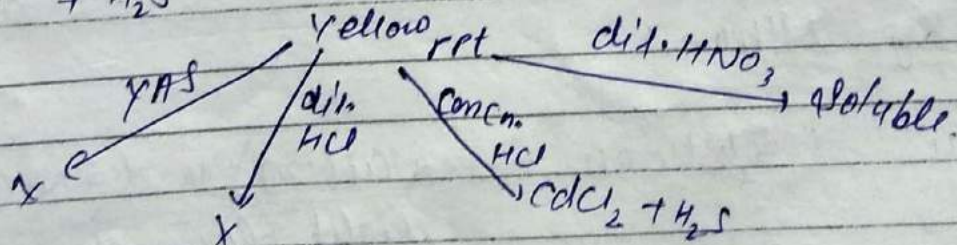
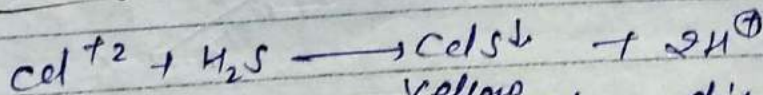
dirty white ppt



(3) test by KF :

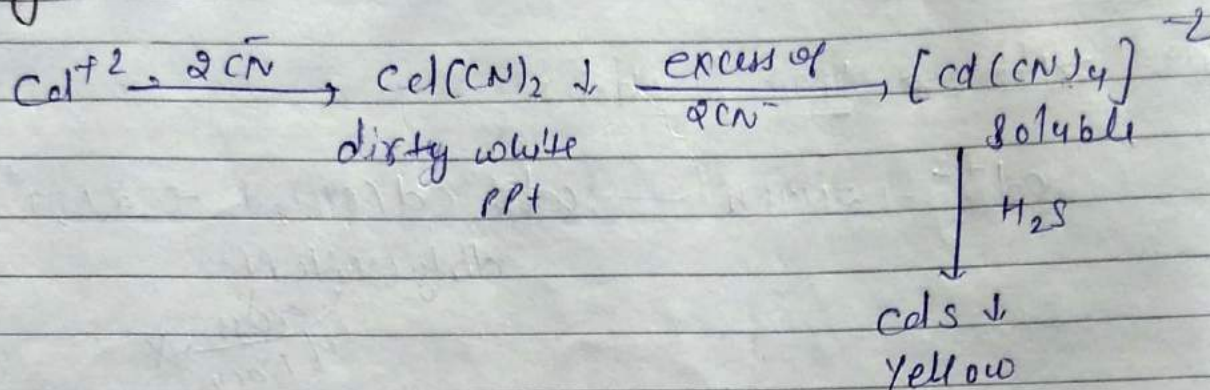


(4) test by H_2S :

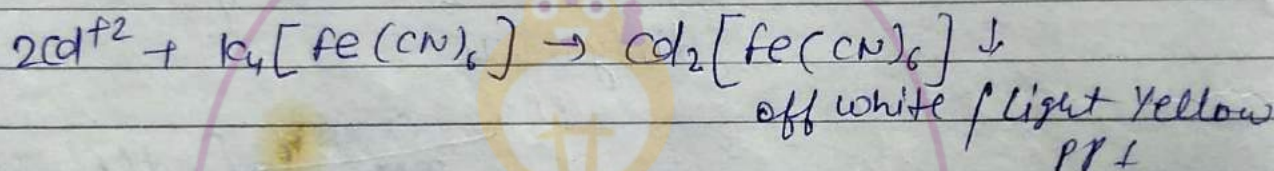


✓
✓

(5) test by NaCN / KCN ⇒

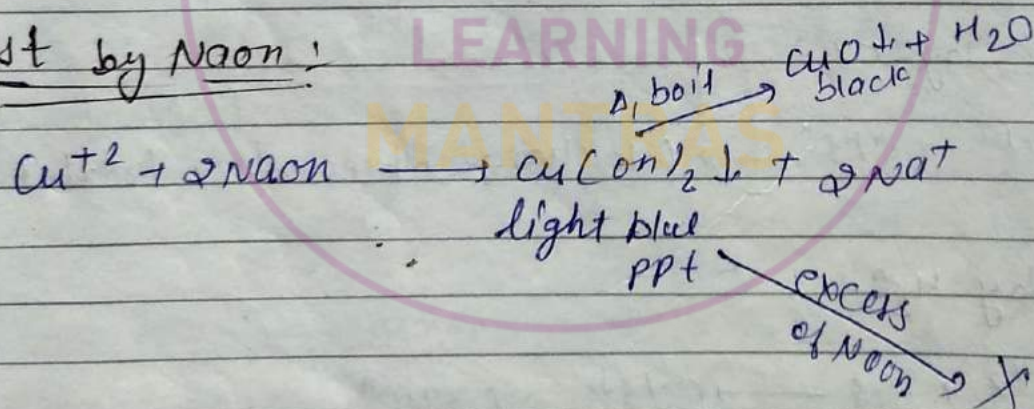


(6) test by K₄[Fe(CN)₆]

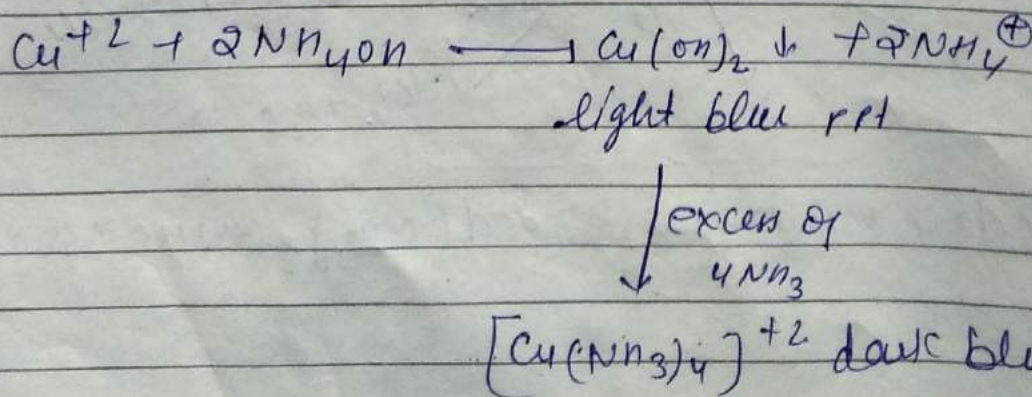


* test of Cu⁺² :

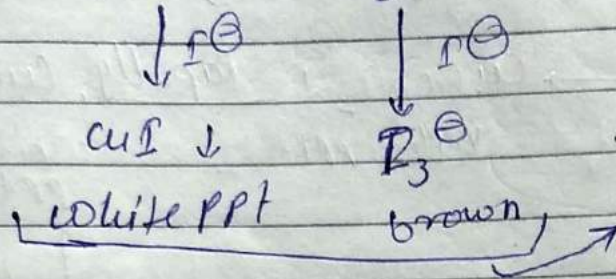
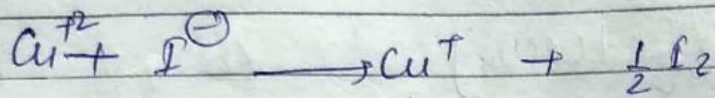
(1) Test by NaOH :



(2) test by NH₄OH :

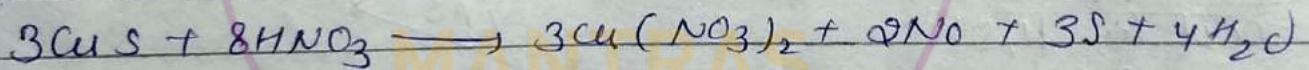
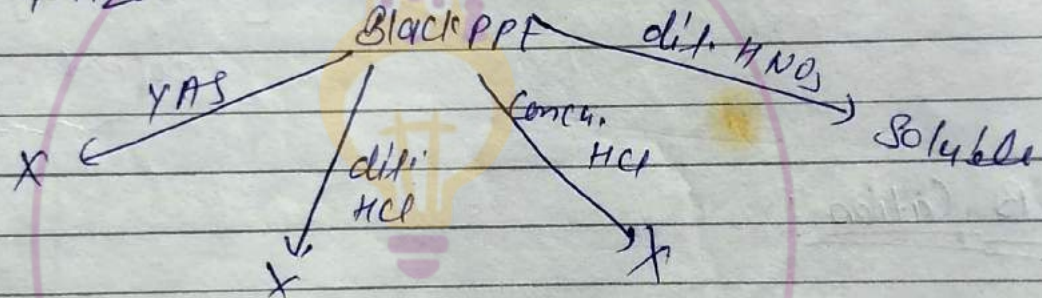
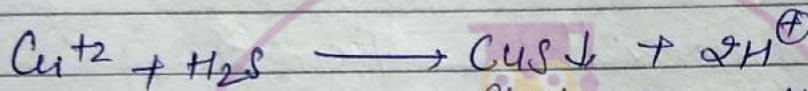


(8) test by KF :

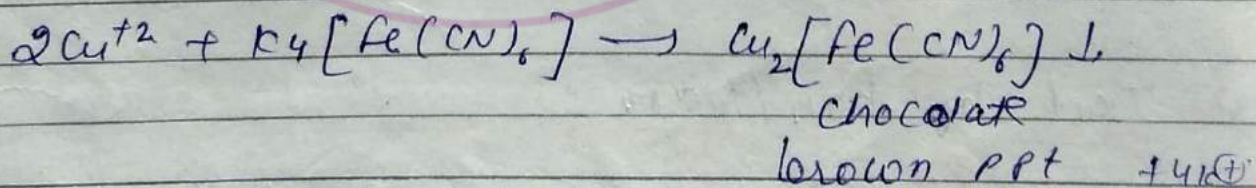


The sol^y absorb at the surface of CuI ppt

(9) test by H_2S :

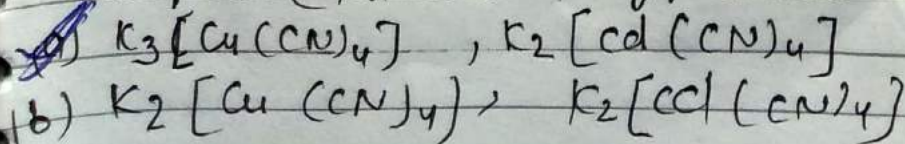


(5) test by $K_4[Fe(CN)_6]$

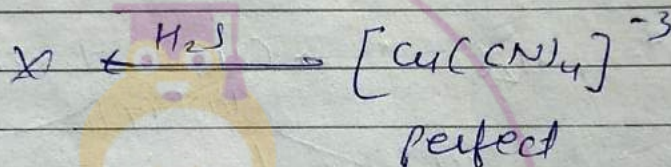
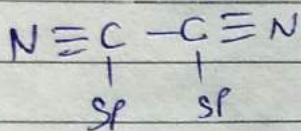
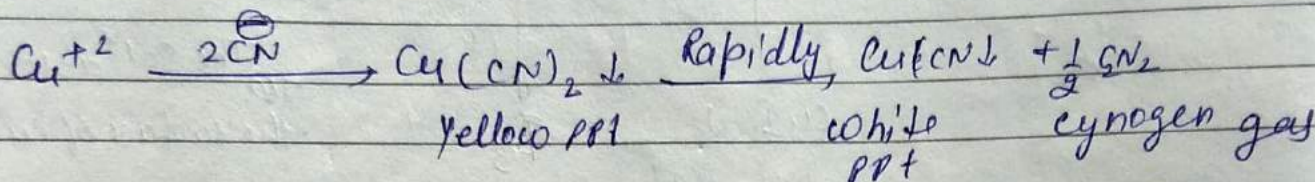
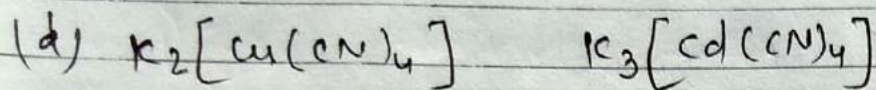
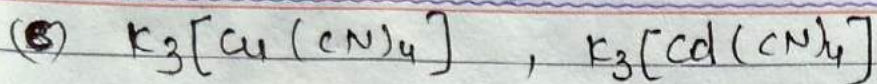


(6) test by $NACN/KCN$:

Ques! When Cu^{+2} and cd^{+2} react with excess of KCN in separate test tube they produce respectively.



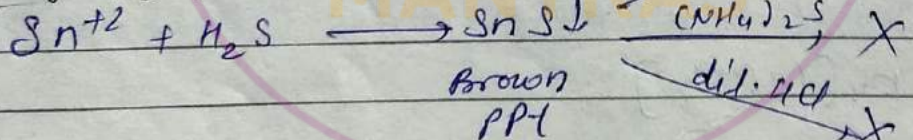
Cu^{+1} is more stable than Cu^{+2}



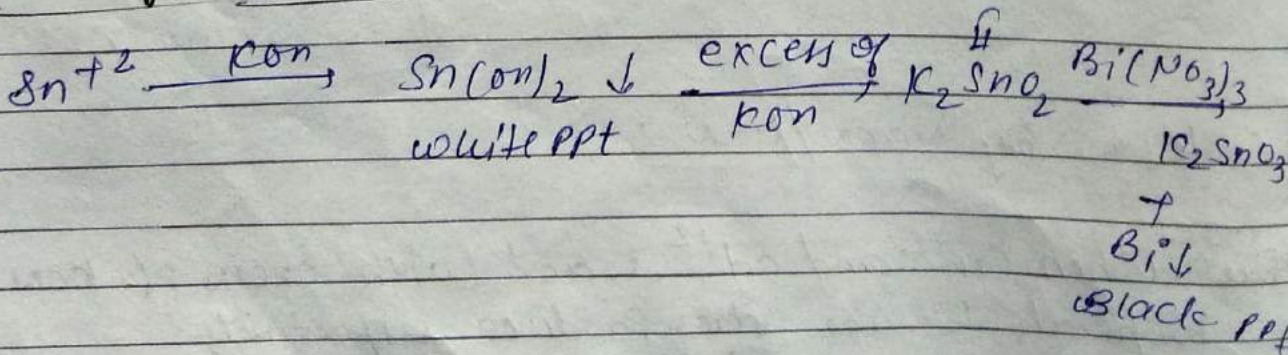
* II-B Cation!

> Test of Sn^{+2} :

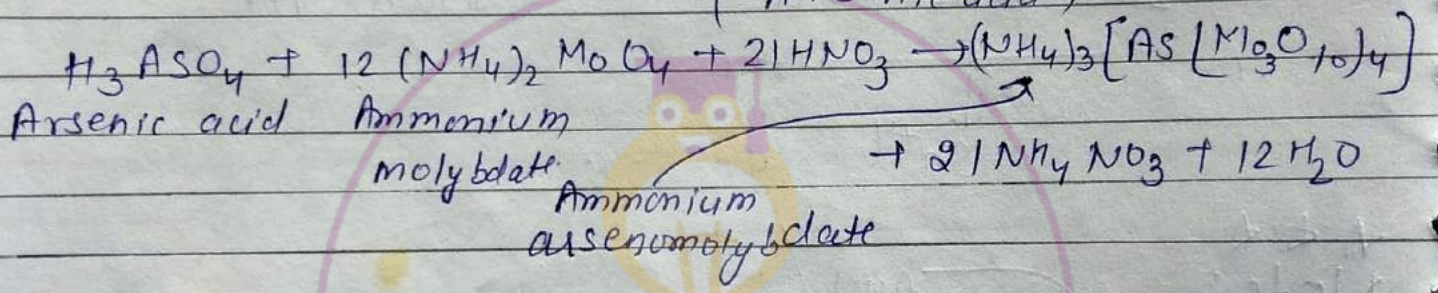
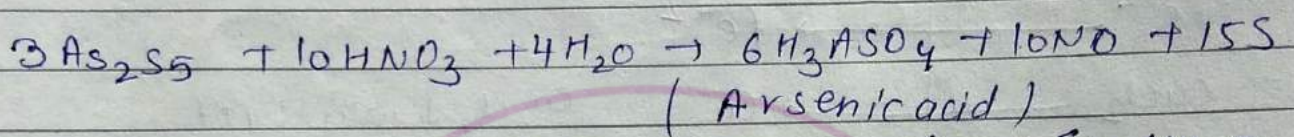
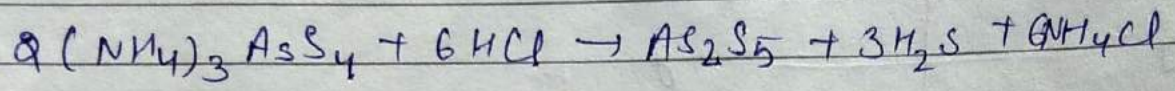
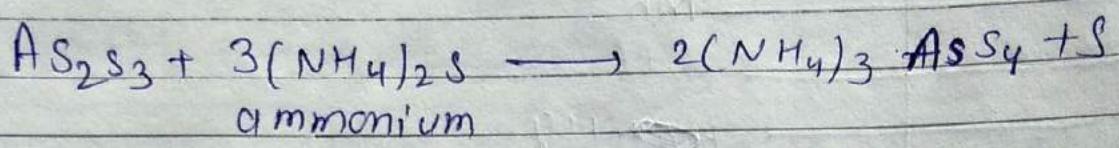
(1) Test by H_2S :



(2) Test by $KOH/NaOH$:



* Test of As:



* Group III $\frac{e}{\cdot}$ ($Al^{+3}, Cr^{+3}, Fe^{+3}$) ($NH_4Cl + NH_4OH$)

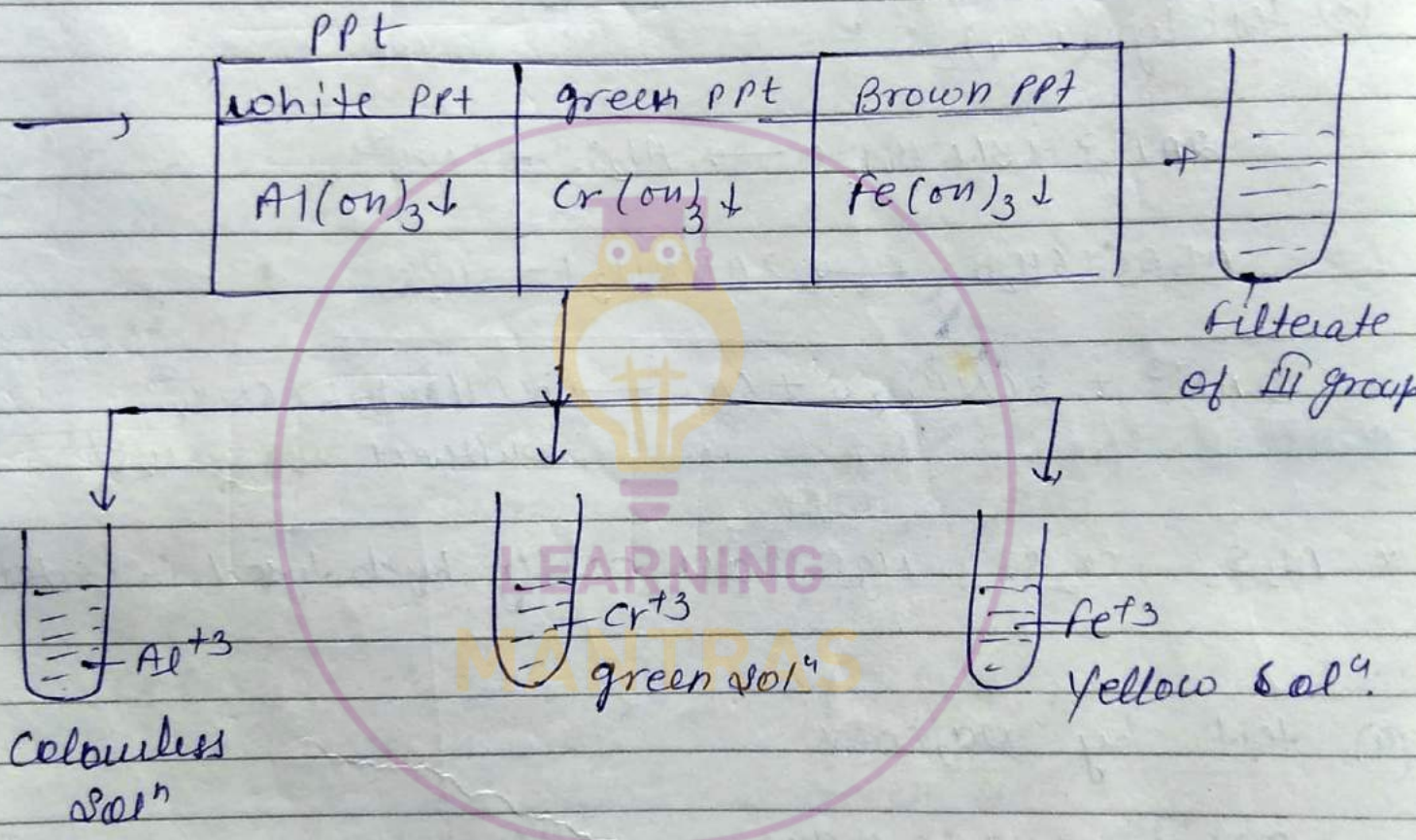
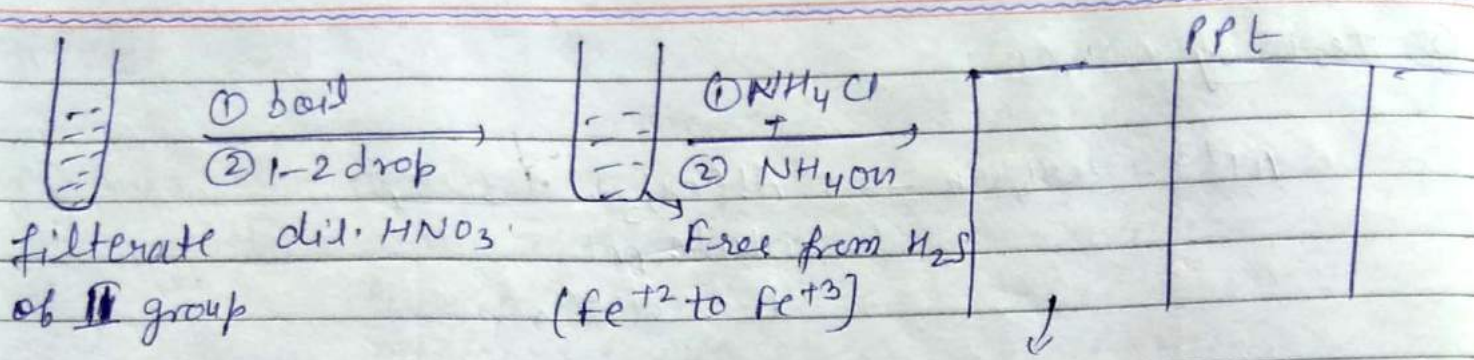
$\Rightarrow Al^{+3}, Cr^{+3}, Fe^{+3}$ does not have carbonate.

1) Before proceeding in 3rd group dissolved H_2S is removed because IIIrd gp cations are ppt in IIIrd group due to dissolve H_2S

2) Small amount of HNO_3 is added (Fe^{+2} oxidised in Fe^{+3})

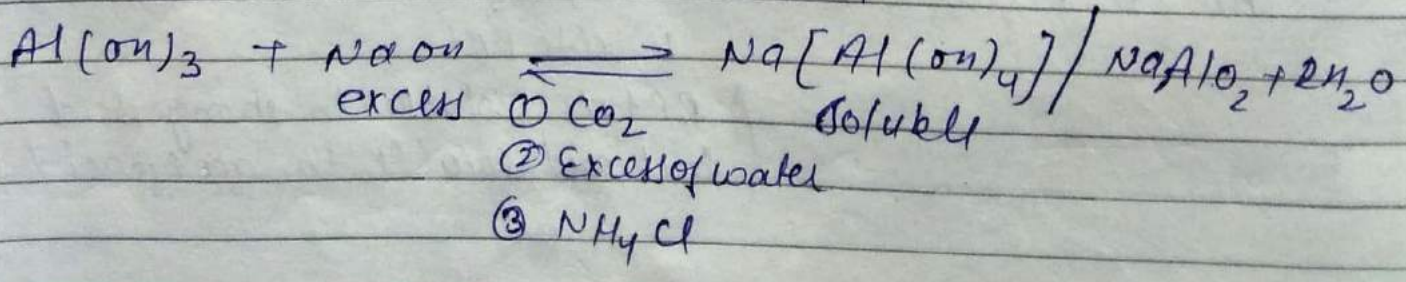
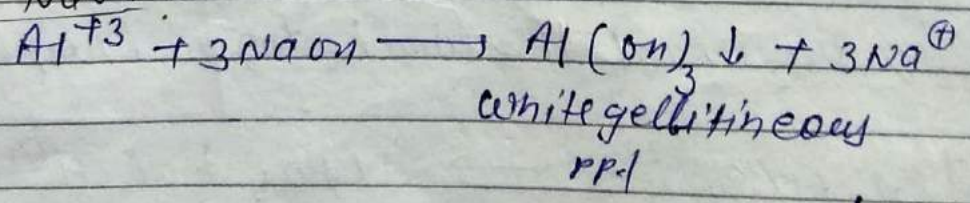
3) IIIrd group cations are ppt in the form of hydroxide ppt by NH_4Cl and NH_4OH

4) NH_4Cl is added to decrease dissociation of NH_4OH by common ion effect

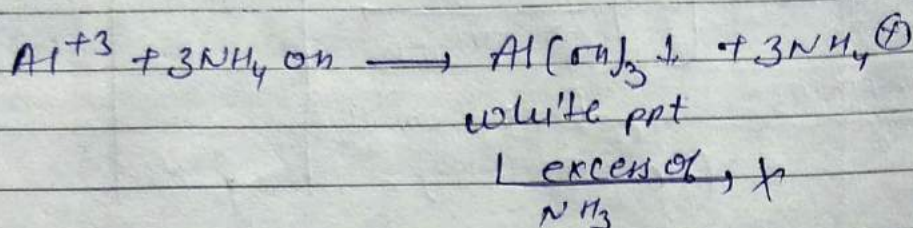


① Test of Al^{+3}

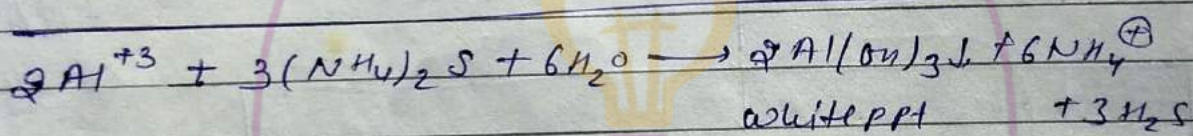
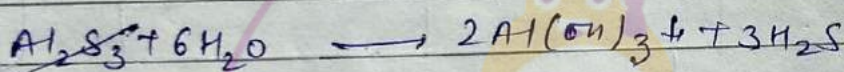
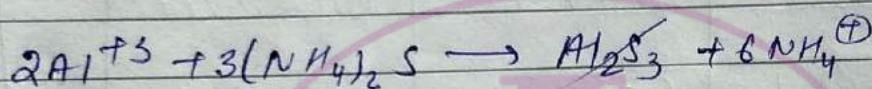
① Test by $NaOH$



(2) Test by NH_4OH :

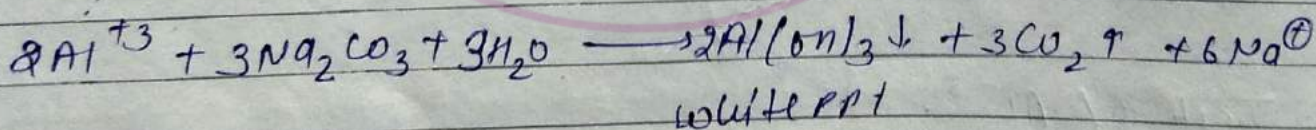


(3) Test by $(\text{NH}_4)_2\text{S}$:

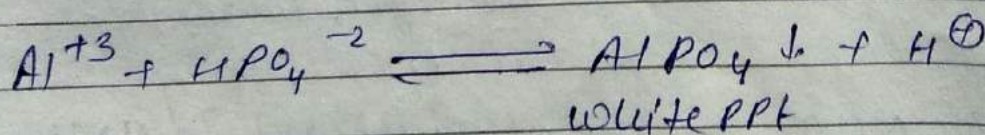


* Al_2S_3 , Cr_2S_3 , MgS are easily hydrolysed in water

(4) Test by Na_2CO_3 :



(5) Test by Na_2HPO_4 (disodium hydrogen phosphate) :



(ppt is soluble in strong acid
but not soluble in acetic acid
(weak acid))

Cr^{+3} = green

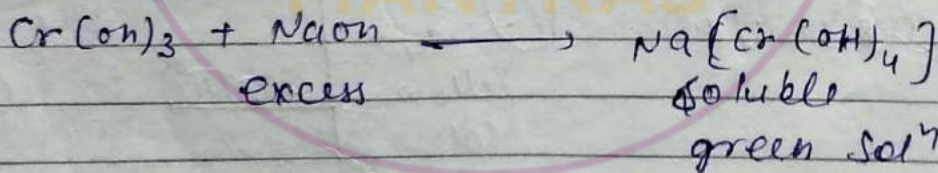
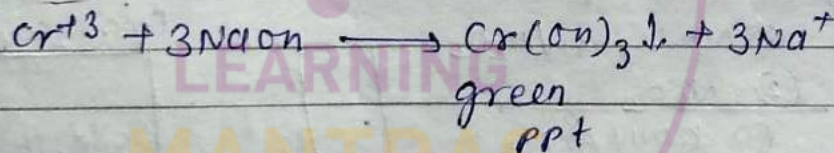
$Cr(NO_3)_3$ 3 temperature violet

Ex: 1 - 29 - 35 cut in
Ex: 2 - 11 - 17

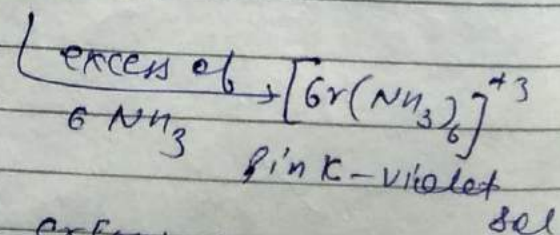
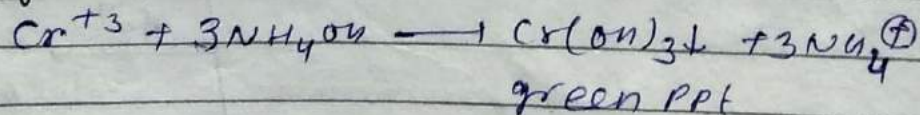
⑥ Lake test: In $AlCl_3$ containing test tube when blue litmus is added to the solution, a red colouration is obtained due to the acidic nature of the solution. on addition of NH_4OH solution drop by drop, the solution becomes alkaline and aluminium hydroxide is precipitated. Aluminium hydroxide absorbs blue colour from the solⁿ and forms insoluble adsorption complex named 'Lake'. Thus a blue mass floating in the colourless solⁿ is obtained. The test is therefore called lake test.

* test of Cr^{+3} :

① test by NaOH :

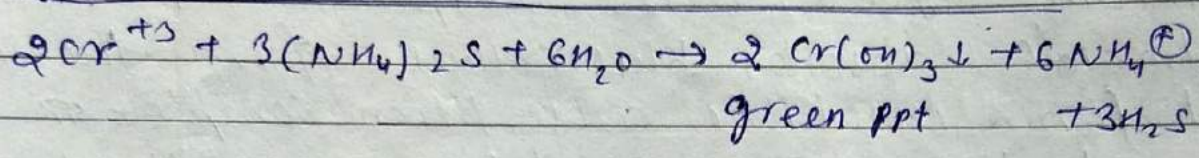
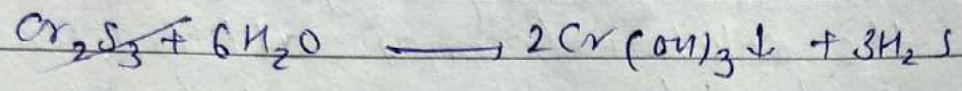
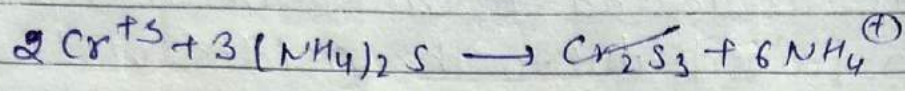


② test by NH_4OH :

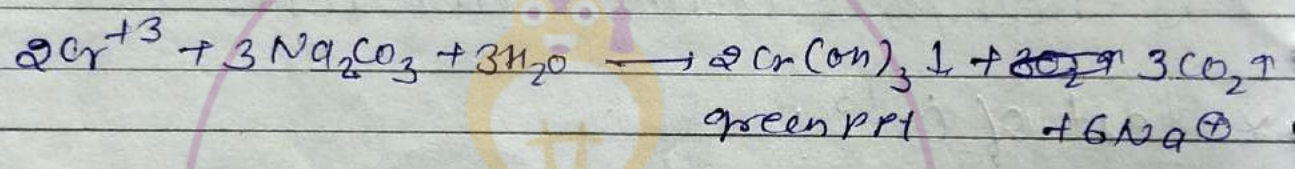


$Cr(OH)_3$ partially soluble
excess in NH_3

⑧ test by (NH₄)₂S ⇒



⑨ test by Na₂CO₃!



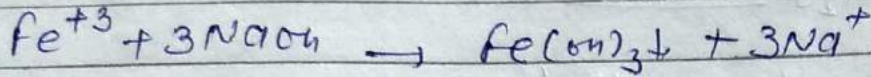
⑩ Test of Cr⁺³ based on its conversion to CrO₄⁻²

| | | | | | | | | | | | | | | | |
|---|--|---|---|--------------------------------------|--|--|--------------------------|----------------------------------|--|---|------------------------------------|-----------------|---|------------------|---|
| <div style="border: 1px solid black; padding: 5px; width: 50px; height: 100px; margin: 0 auto;"> <p style="text-align: center;">Cr⁺³ green solⁿ.</p> </div> | <p>① NaOH(aq) / H₂O₂</p> <p>② Na₂CO₃</p> <p>③ KOH / Br₂, Δ</p> <p>④ S₂O₈⁻² / H⁺</p> | <div style="border: 1px solid black; padding: 5px; width: 50px; height: 100px; margin: 0 auto;"> <p style="text-align: center;">CrO₄⁻² Yellow solⁿ.</p> </div> | <table border="0" style="width: 100%;"> <tr> <td style="border-right: 1px solid black; padding: 5px;">Conc. H₂SO₄</td> <td style="padding: 5px;">Cr₂O₇⁻² orange</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">H₂SO₄ / H₂O₂</td> <td style="padding: 5px;">CrO₅ blue</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">SO₂ / H⁺</td> <td style="padding: 5px;">SO₄⁻² + Cr⁺³ green.</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Pb⁺² / CH₃COOH</td> <td style="padding: 5px;">PbCrO₄ ↓ yellow ppt</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Ag⁺</td> <td style="padding: 5px;">Ag₂CrO₄ ↓ brick red ppt</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Hg⁺²</td> <td style="padding: 5px;">Hg₂CrO₄ ↓ brick red ppt</td> </tr> </table> | Conc. H ₂ SO ₄ | Cr ₂ O ₇ ⁻² orange | H ₂ SO ₄ / H ₂ O ₂ | CrO ₅ blue | SO ₂ / H ⁺ | SO ₄ ⁻² + Cr ⁺³ green. | Pb ⁺² / CH ₃ COOH | PbCrO ₄ ↓ yellow ppt | Ag ⁺ | Ag ₂ CrO ₄ ↓ brick red ppt | Hg ⁺² | Hg ₂ CrO ₄ ↓ brick red ppt |
| Conc. H ₂ SO ₄ | Cr ₂ O ₇ ⁻² orange | | | | | | | | | | | | | | |
| H ₂ SO ₄ / H ₂ O ₂ | CrO ₅ blue | | | | | | | | | | | | | | |
| SO ₂ / H ⁺ | SO ₄ ⁻² + Cr ⁺³ green. | | | | | | | | | | | | | | |
| Pb ⁺² / CH ₃ COOH | PbCrO ₄ ↓ yellow ppt | | | | | | | | | | | | | | |
| Ag ⁺ | Ag ₂ CrO ₄ ↓ brick red ppt | | | | | | | | | | | | | | |
| Hg ⁺² | Hg ₂ CrO ₄ ↓ brick red ppt | | | | | | | | | | | | | | |

Imp:

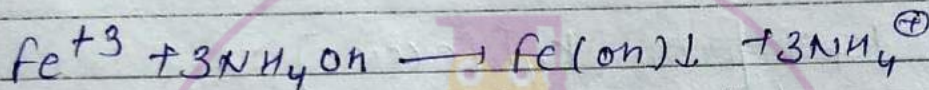
* Test of Fe⁺³:

① Test by NaOH:



NaOH / excess \swarrow ✓
Brown ppt \searrow dil. HNO₃ ✓

② Test by NH₄OH:



Brown ppt

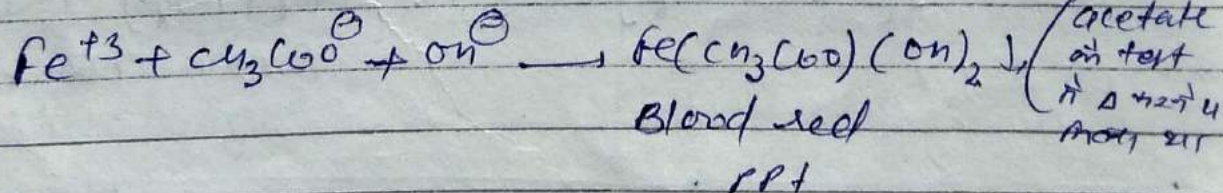
excess of \rightarrow X
6 NH₃

③ Test by KSCN:



Blood red colour

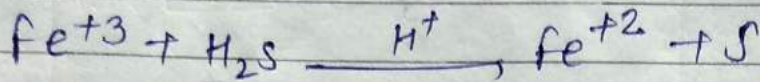
④ Test by CH₃COO⁻Na⁺:



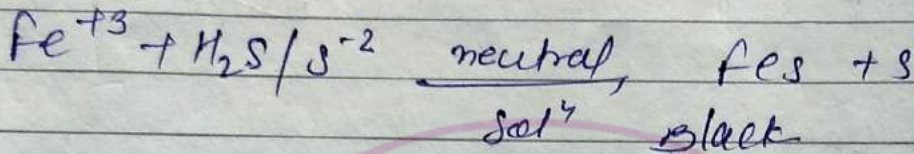
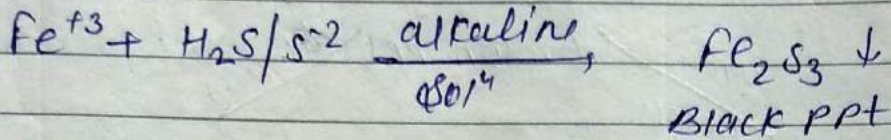
* ~~test of~~

⑤ Test by H_2S

Imp.



Leach

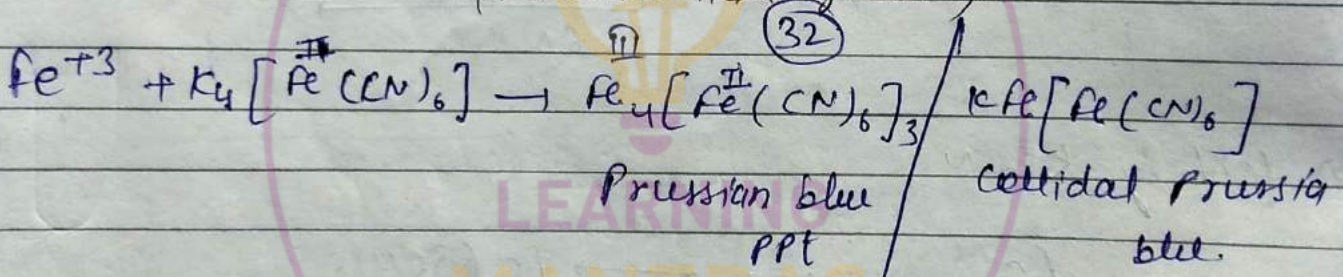


Imp.

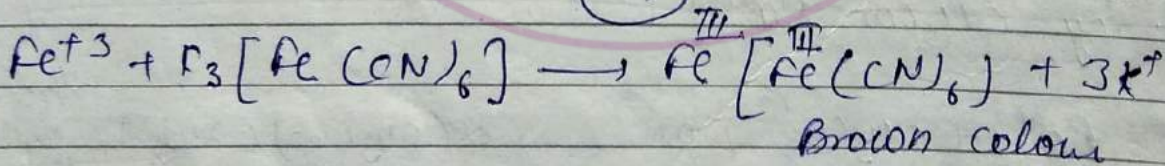
⑥

Test by $K_4[Fe(CN)_6]$ $K_3[Fe(CN)_6]$

(Potassium hexacyanoferrate II)
or
(Potassium hexacyanide)



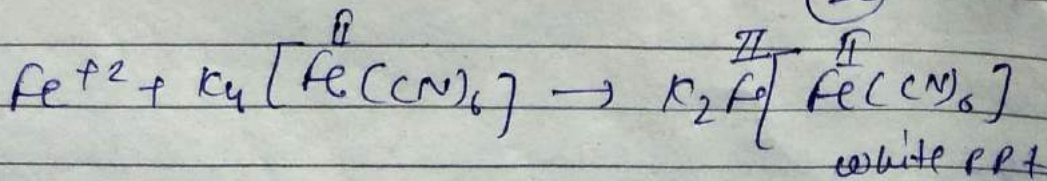
⑦ test by $K_3[Fe^{III}(CN)_6]$ (Potassium hexacyanoferrate III) / Potassium ferricyanide



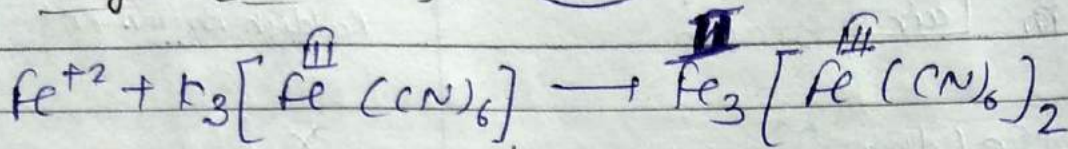
Note

Test of Fe^{+2} :

(1) Test by $K_4[Fe(CN)_6]$:

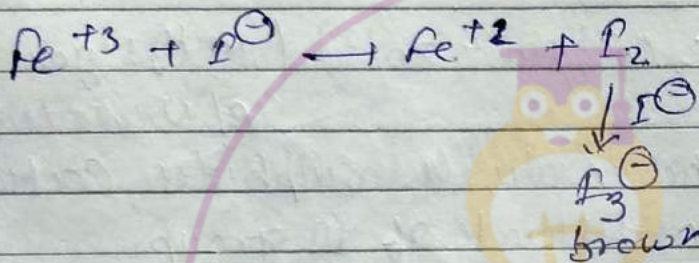


② test by $K_3[Fe(CN)_6]$: 23

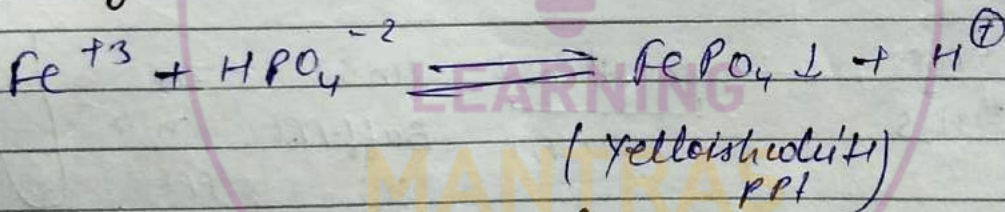


Turn's bull's blue ppt

⑧ test by KI



⑨ Test by Na_2HPO_4 !



(ppt is soluble in strong acid).

Ques! write the difference b/w Fe^{+2} and Fe^{+3} !

| | Fe^{+2} | Fe^{+3} |
|-------------------|---------------------------|----------------------|
| ① SCN^- | No change | Blood Red. |
| ② $K_4[Fe(CN)_6]$ | ②② white ppt | ③② Prussian blue ppt |
| ③ $K_3[Fe(CN)_6]$ | ②③ Turn's bull's blue ppt | ③③ Brown colour. |

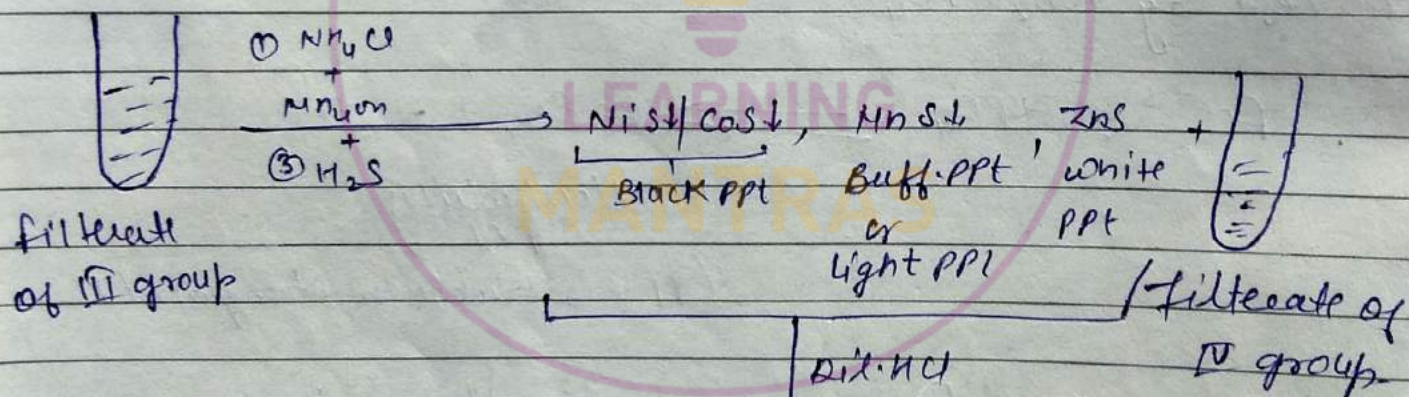
rosy red colour \Rightarrow $Fe^{2+}, Co^{2+}, Ni^{2+}$ with dmg Product rosy red colour
 Complex (PPT)
 basic

full sheet
 face

| | | |
|----------------------|---|--|
| (4) NaOH | $Fe(OH)_2 \downarrow$ (dirty green ppt) $\xrightarrow{\text{air}}$ Brown | $Fe(OH)_3 \downarrow$ Reddish Brown ppt |
| (5) dmg ⁻ | $[Fe(dmg)_2]^\ominus$ rosy red ppt | X |
| (6) I^\ominus | No Redox | I_3^\ominus (Brown) |

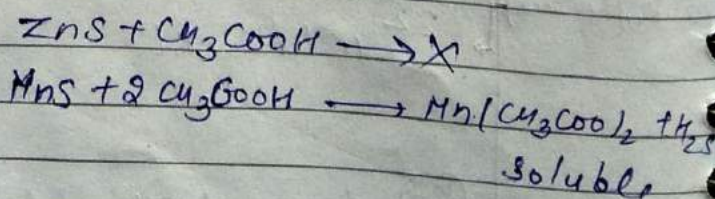
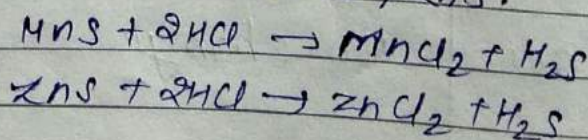
* Group IV : ($Ni^{2+}, Co^{2+}, Mn^{2+}, Zn^{2+}$) (H_2S gas in presence of $NH_4OH + NH_4Cl$)

1) In group IV all the insoluble sulphides cations are ppt remaining in filtrate of III group.



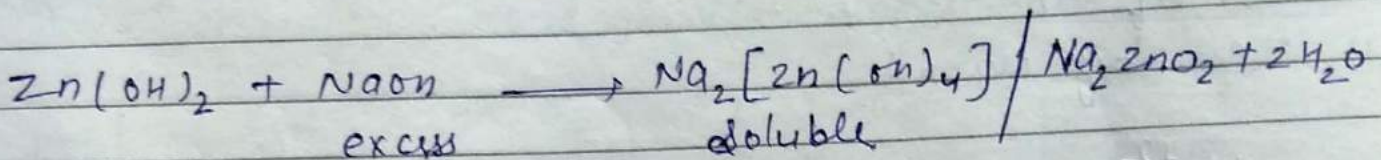
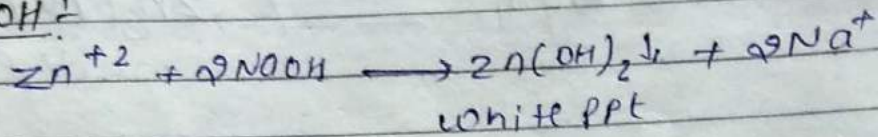
if not soluble
 NiS/CoS
 \downarrow hot and conc. HNO_3 or aqua regia

Ni^{2+} green solⁿ | Co^{2+} pink solⁿ.

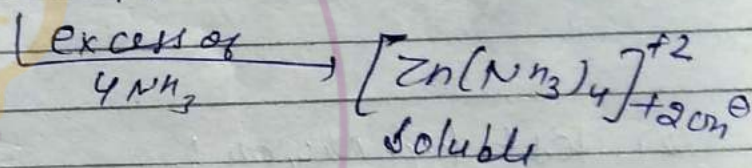
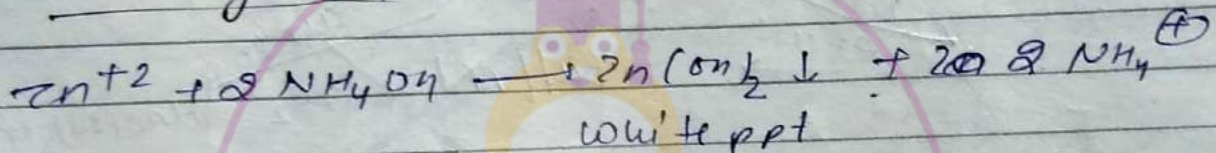


(1) test of Zn^{+2} :

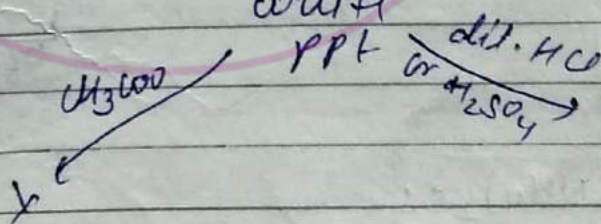
① test by NaOH!



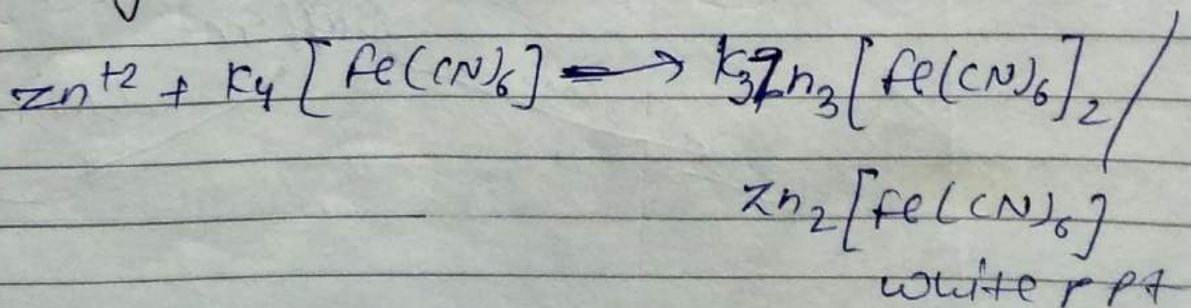
② test by NH_4OH



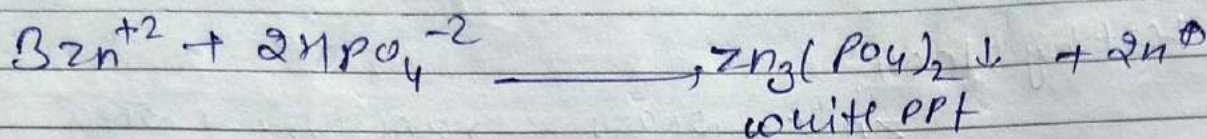
③ test by $(NH_4)_2S$



Test
④ test by $K_4[Fe(CN)_6]$

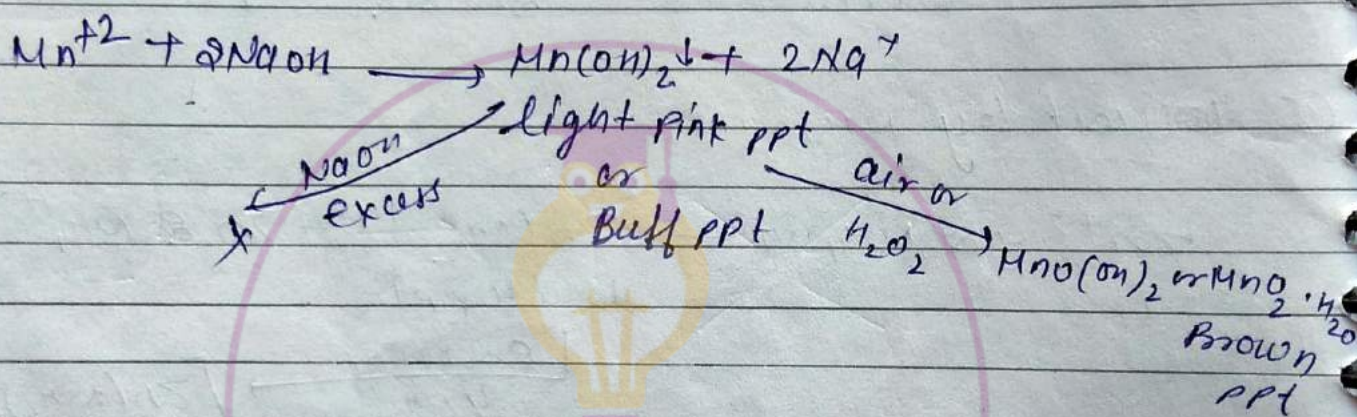


(5) Test by Na_2HPO_4 !

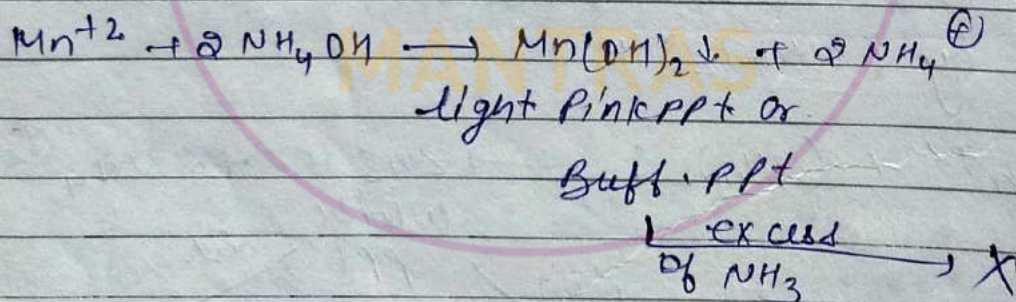


* Test of Mn^{+2} !

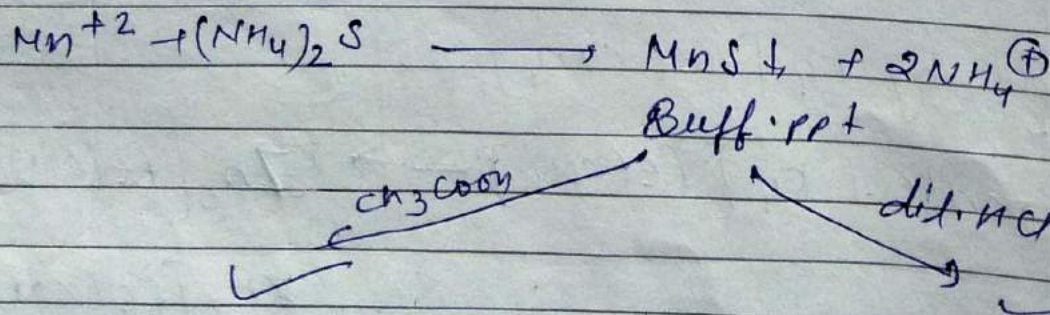
(1) Test by NaOH !



(2) Test by NH_4OH !



(3) Test by $(\text{NH}_4)_2\text{S}$!



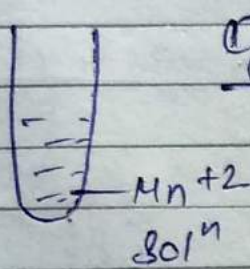
peroxy ditungstate

MnO_4^- - Purple

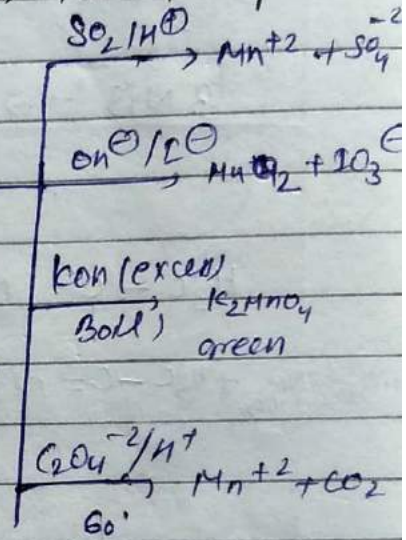
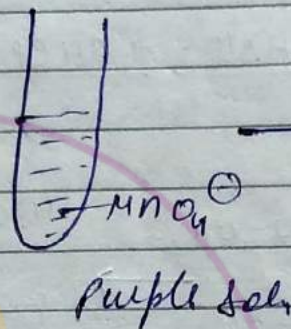
(4) test by Na_2HPO_4 !



(5) test of Mn^{+2} based on its conversion to MnO_4^-

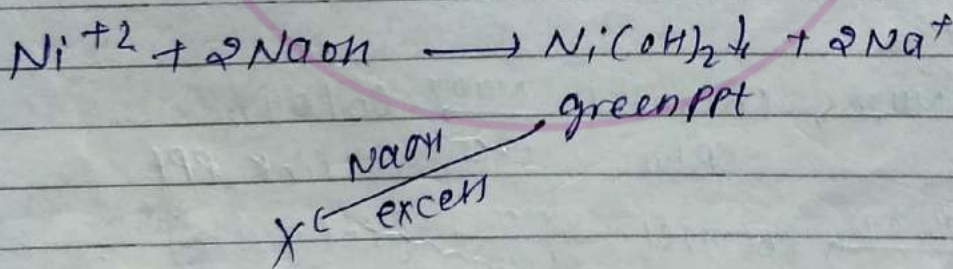


- ① PbO_2 / H^+ , Δ
 - ② $Na_2S_2O_8 / H^+$, Δ
 - ③ $NaBiO_3 / H^+$, Δ
- sodium bismuthate
(strong oxidising agent)

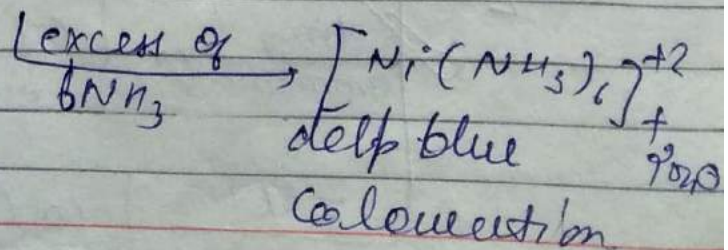
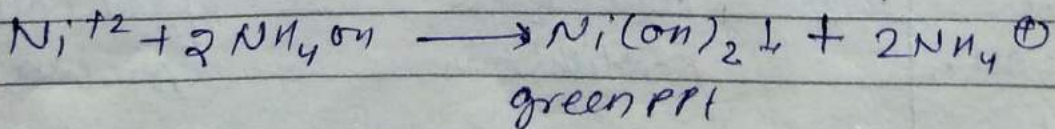


(2) Test of Ni^{+2}

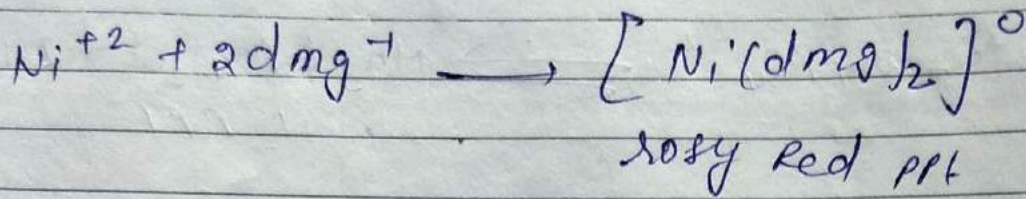
① test by $NaOH$



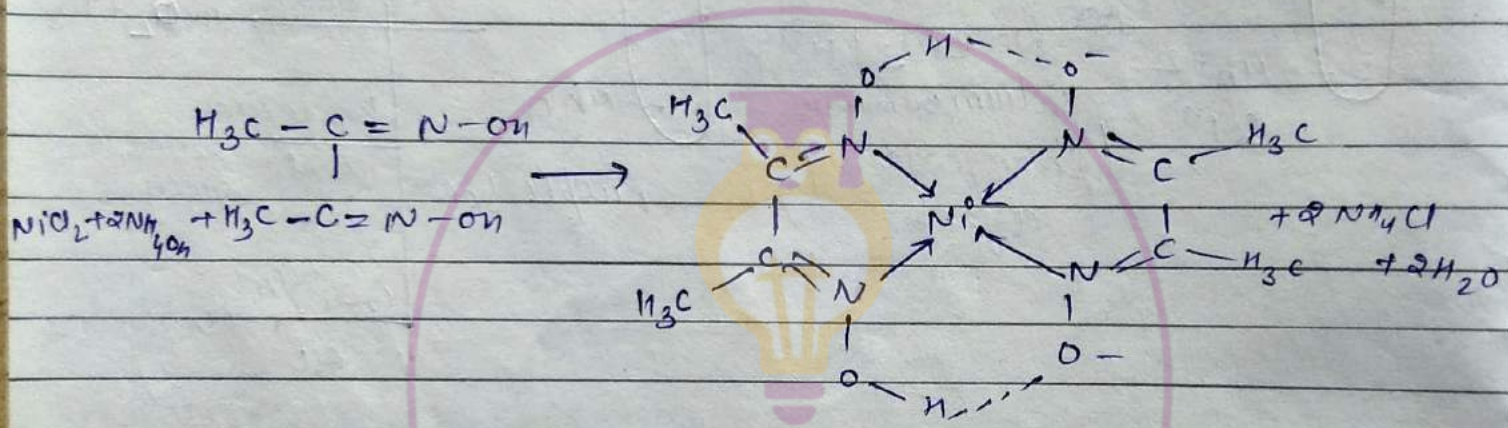
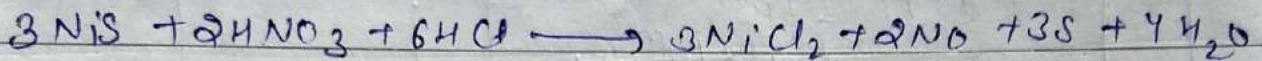
② test by NH_4OH



③ test by dmg⁻ !

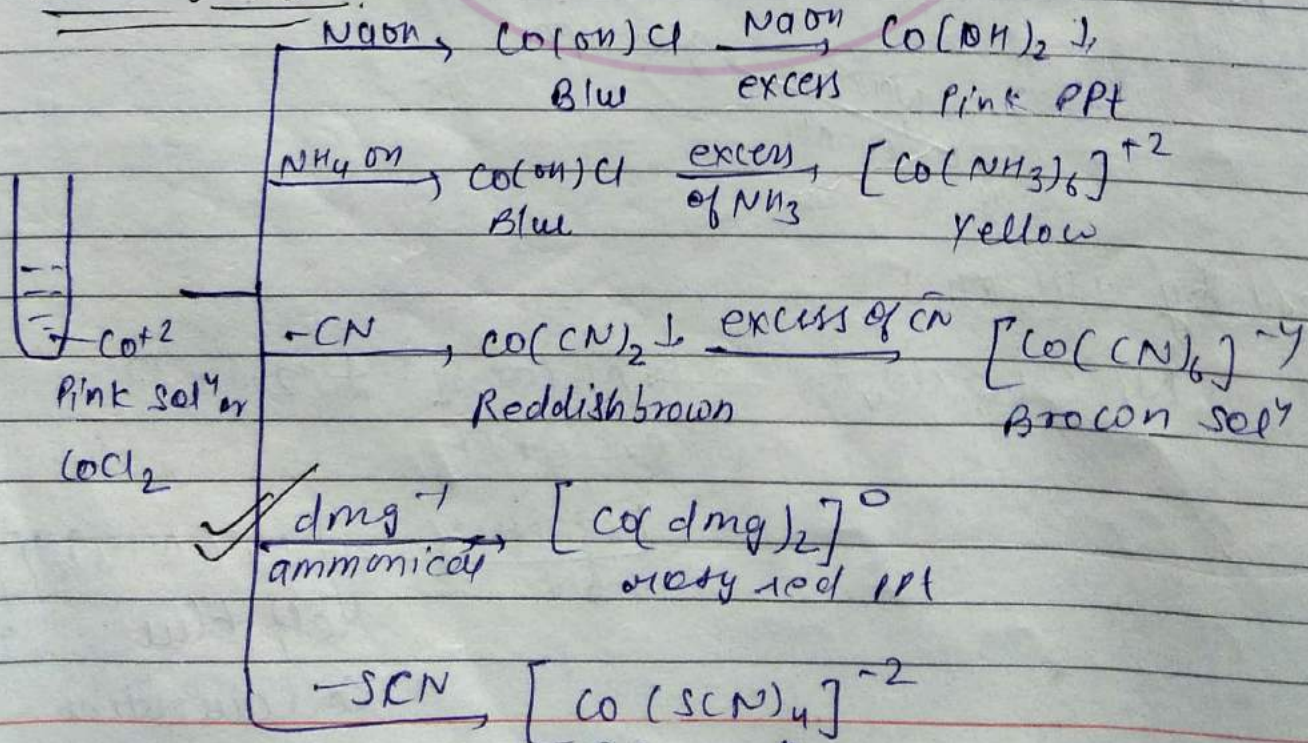


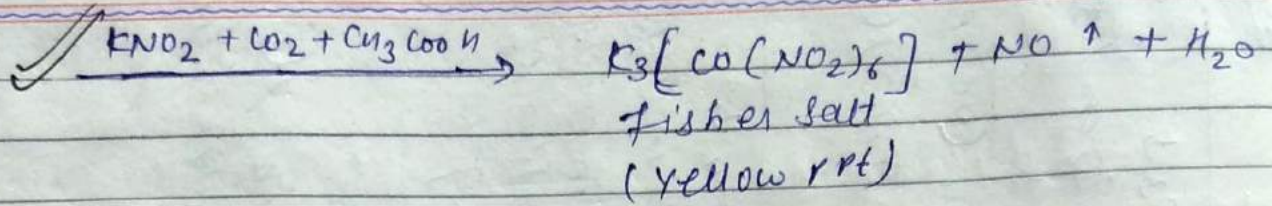
OR.



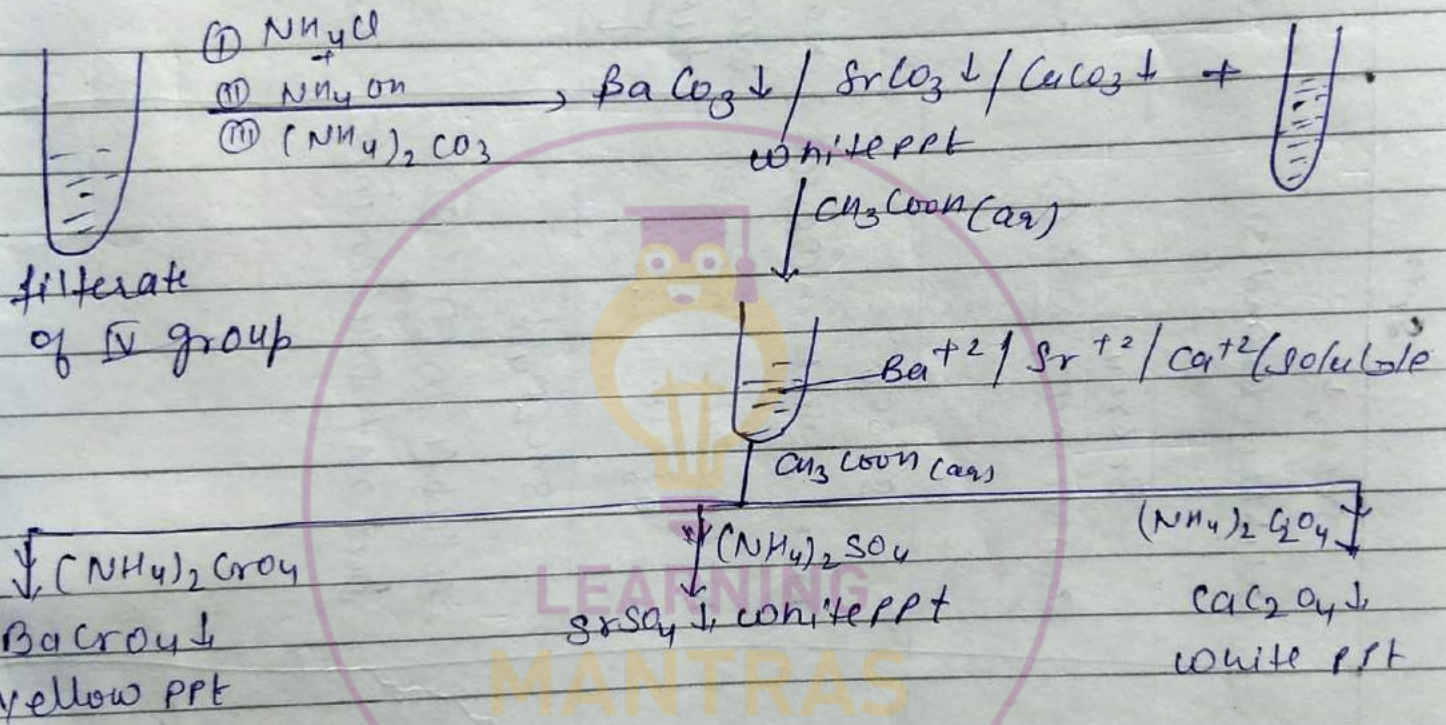
Complex of rosy colour
(stable form of complex)

↳ Test of CO⁺²





* Group V \Rightarrow (Ba^{+2} , Sr^{+2} , Ca^{+2}) ($(\text{NH}_4)_2\text{CO}_3$ in presence of $(\text{NH}_4\text{OH} + \text{NH}_4\text{Cl})$)



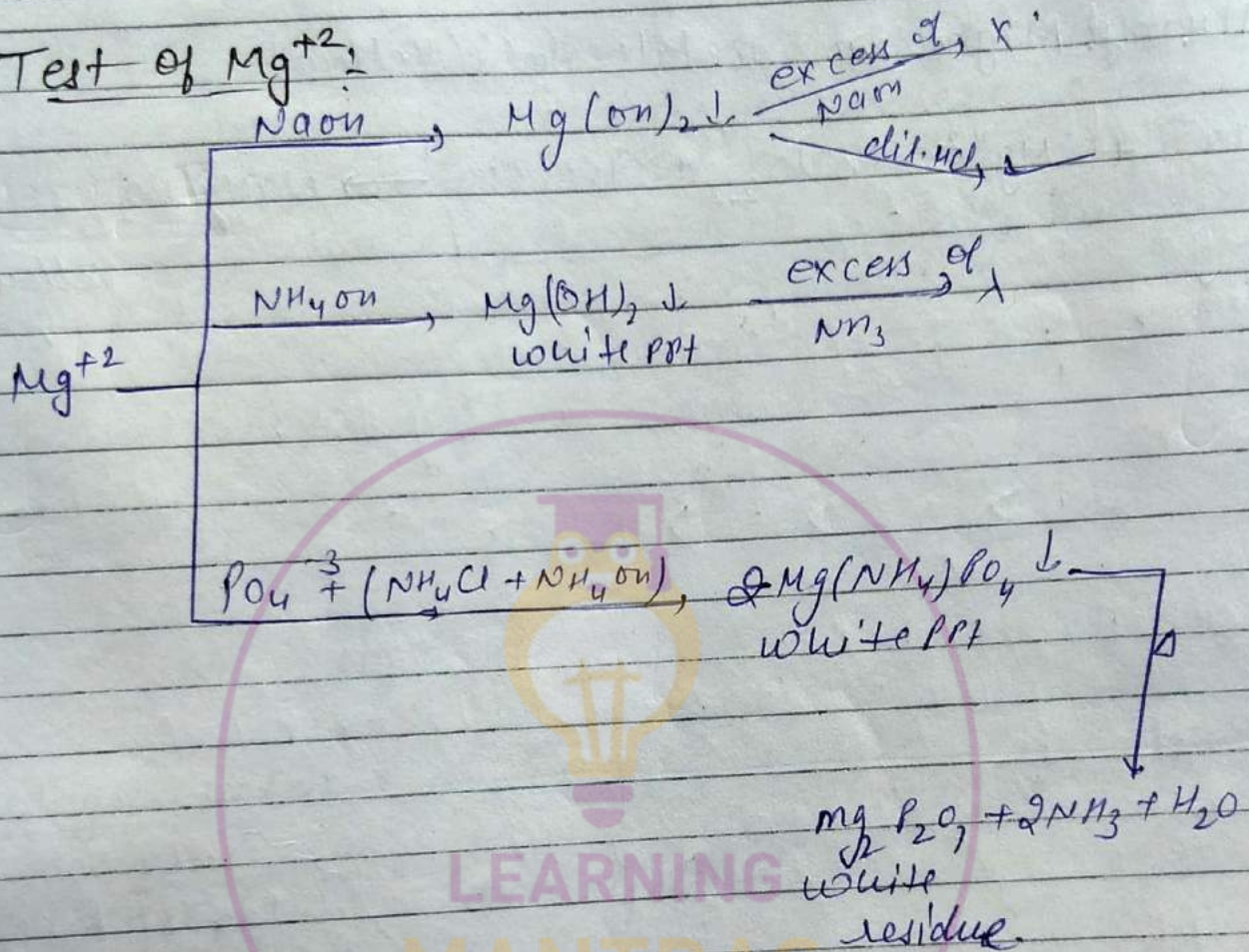
In V group MgCO_3 is not ppt because low concⁿ of CO_3^{-2} due to following eqⁿ.



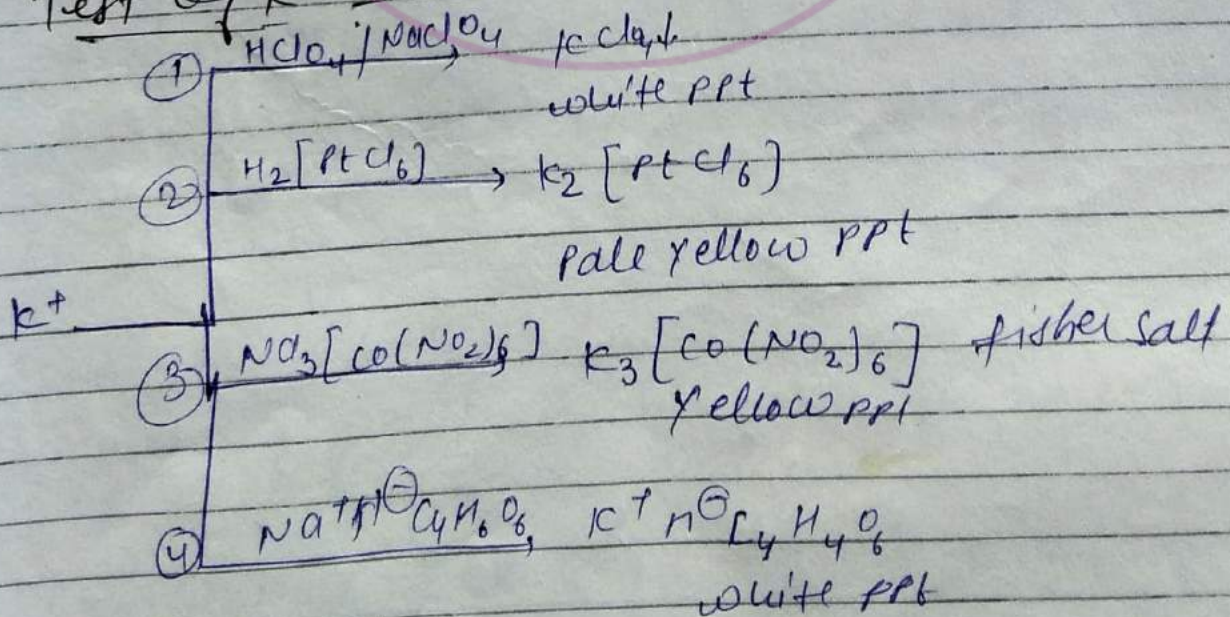
| ① HCO ⁻² | ② HNO ₃ | ③ CH ₃ COOH Ba ⁺² | Sr ⁺² | Ca ⁺² | Learn |
|---|--|--|--|--|-------|
| CO ₃ ⁻² white | BaCO ₃ ↓ Soluble in ① and ③ | | SrCO ₃ ↓ Soluble in ① and ③ | CaCO ₃ ↓ Soluble in ① and ③ | |
| CrO ₄ ⁻² yellow | BaCrO ₄ ↓ Soluble in ① & ② but not soluble in ③ | | SrCrO ₄ ↓ Soluble in ①, ② & ③ | CaCrO ₄ (No ppt) Soluble in ①, ② & ③ | |
| SO ₄ ⁻² white | BaSO ₄ ↓ Not soluble in ①, ② & ③ Not soluble in excess of (NH ₄) ₂ SO ₄ | | SrSO ₄ Not soluble in ①, ② & ③ Not soluble in excess of (NH ₄) ₂ SO ₄ | CaSO ₄ ↓ Not soluble in ① & ③ but soluble in excess (NH ₄) ₂ SO ₄ due to formation of [Ca(SO ₄) ₂] ⁻² | |
| C ₂ O ₄ ⁻² | BaC ₂ O ₄ ↓ Soluble in ①, ② and ③ | | SrC ₂ O ₄ ↓ Soluble in ① & ② but not soluble in ③ | CaC ₂ O ₄ ↓ Soluble in ① but not soluble in ③ | |

Group - V (Na^+ , Mg^{2+} , K^+) (No. common group reagent)

① Test of Mg^{2+} :



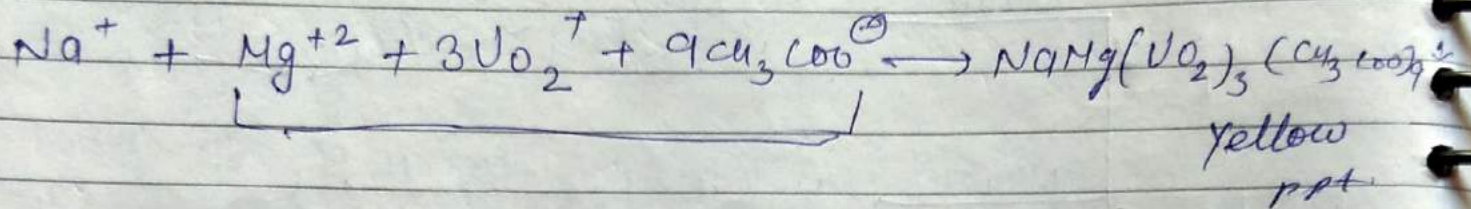
(2) Test of K^+ :



Test 2, 3, and 4 also given by NH_4^+

Q.iii) test of Na^+ :

Uranyl Magnesium acetate solⁿ (Yellow)



Learning Mantras

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MANTRAS